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Soils and Crops

Project Results
1988

Soil & Crop Improvement Associations

A C K N O W L E D G E M E N T S

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PERENNIAL RYEGRASS SCREENING TRIALS

Bill Thomas, Provincial Forage Specialist

Perennial ryegrasses are high in quality, can be grown on a wide range of soil types and make an excellent pasture or silage. However, if subjected to extended low temperatures, especially late in the winter, they are susceptible to winter injury. In recent years, grass breeders have developed ryegrass cultivars with greater cold tolerance. In order to test the suitability of cultivars reported to have superior winter hardiness the Nova Scotia Dept. of Agriculture began screening perennial ryegrass cultivars for winter hardiness at two test sites; Lower Debert, Colchester County and Lower Canard, Kings County.

Both sites were established in 1985 and contained up to forty-two of the most winter hardy cultivars available from Western Europe. From these trials up to sixteen of the most promising cultivars were selected and seeded along with other promising enteries at two new test sites; Truro and Hardwoodlands.

The Hardwoodlands site was chosen for it's heavy soil type and poor drainage. The Truro site is more moderate with a loamy soil and good drainage.

The site at Lower Debert was plowed down in 1987 leaving the three test sites; Truro, Hardwoodlands and Lower Canard.

The winter of 87-88 though hard on crops, provided an excellent opportunity to screen out the most winter hardy cultivars. Observations made in early spring showed Riikka, Gunne and Norlea to be the most winter hardy.

Perennial Ryegrass Screening Trial

Location: Hardwoodlands, Hants County, Nova Scotia
Soil Type: Queens Series - Fine Loam, Poorly drained
Plot Size: 1.5m x 5m
Experimental Design: Randomized Block
No. of Replicates: 4
Fertilization:
May 5, 1988 34-0-0 250 kg/ha
July 12, 1988 34-0-0 100 kg/ha
Aug. 9, 1988 18-6-18 250 kg/ha
Sept. 30, 1988 0-0-60 250 kg/ha
Herbicide Application: July 20, 1988, 2,4-D/mecoprop/dicamba mix @ 6 l/ha

		Dry Matter Yield kg/ha				
Cultivar	Spring Vigor (1 poor, 9 best)	Cut 1 June 14	Cut 2 July 12	Cut 3 Aug. 9	Cut 4 Sept. 30	Total
DP1-6	4	3177	1289	1262	3165	8892 a
Parcour	5	3577	1406	1169	2527	8679 a
Riikka	5	3108	1259	1162	2871	8400 ab
Fantoom	4	1809	1811	951	3563	8135 ab
Preference	4	2108	1510	1330	3153	8101 ab
Hella	4	2744	1198	1062	2971	7975 ab
Bardetta	4	2557	1272	981	3075	7885 ab
Barnasso	5	2875	1064	992	2772	7703 ab
Gunne	4	2119	1260	1104	3188	7671 ab
Baranna	5	3002	951	970	2719	7642 ab
Svea	4	2431	1208	1056	2923	7618 ab
Wendy	4	1941	1314	1124	2934	7313 ab
Lamora	5	1990	1272	1051	2893	7205 ab
Valinge	4	2671	1051	894	2416	7032 ab
Norlea	5	2331	1159	842	2199	6530 b

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

Perennial Ryegrass Screening Trial

Location: Truro, Colchester County, Nova Scotia
Soil Type: Pugwash Series - coarse loam, well drained
Plot Size: 1.5m x 5m
Experimental Design: Randomized Block
Established: 1986
No. of Replicates: 3
Fertilizer: May 10, 34-0-0 250 kg/ha
June 16, 17-17-17 225 kg/ha
July 6, 34-0-0 100 kg/ha

Herbicide Application: June 16, 2,4-D/mecoprop/dicamba mix @ 1.75 L/ha

Cultivar	Spring Vigor (1 poor, 9 best)	Dry Matter Yield kg/ha Cut June 8	Cut July 7	Cut Aug. 8	Total	Yield
Gunne	6	2193	2214	2061	6468	a
Riikka	6	2441	2073	1680	6195	ab
Norlea	6	2943	1874	1287	6104	ab
Citadel	4.5	1225	2599	2133	5956	abc
Valinge	6	2728	1684	1414	5826	abc
Fantoom	4	822	2787	2146	5755	abcd
Preference	4.5	1162	2401	2169	5732	abcd
Meltra	4.5	1082	2653	1931	5667	abcd
Svea	4.5	1892	1952	1745	5589	abcd
Lamora	4.5	744	2349	2487	5580	abcd
Peramo	4.5	1622	2082	1822	5526	abcd
Morenne	4.5	789	2654	2059	5503	abcd
Contender	3	402	2639	2463	5503	abcd
Condesa	4.5	926	2210	2227	5363	abcd
Wendy	4.5	595	2452	2150	5197	abcd
Bow 1	3	490	2365	2296	5151	abcd
DP1-6P	4.5	1410	2042	1542	4994	abcd
Parcour	3	681	2423	1828	4932	abcd
Salem	3	477	2358	2012	4848	abcd
Barlet	3	720	2302	1741	4763	bcd
Hella	3	936	2140	1639	4715	bcd
Vigor	3	405	1988	2127	4520	bcd
Chantal	3	431	2173	1737	4341	cd
Barnasso	4.5	860	1832	1446	4138	d

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

Perennial Ryegrass Screening Trial

Location: Lower Canard, Kings County, Nova Scotia
Soil: Truro series - fine sandy loam, very well drained
Plot Size: 1.5m x 3.5m
Experimental Design: Randomized Block
No of Replicates: 4
Established: 1985
Fertilization:
May 9 34-0-0 250 kg/ha
June 22 18-6-18 350 kg/ha
July 15 34-0-0 100 kg/ha
Sept. 21 0-0-60 200 kg/ha

Herbicide Application: July 20, 2,4-D/mecoprop/dicamba mix @ 6 l/ha

Dry Matter Yield kg/ha

Cultivar	Cut June 9	Cut July 14	Cut Sept. 16	Total Yield
Barlano	4105	1665	2385	8155 a
Gunne	3151	2160	1986	7296 ab
Bastion	2187	3018	1975	7180 ab
Preference	1664	3347	2081	7092 ab
Meltra	1665	3179	2201	7045 ab
Belfort	1743	2986	2255	6984 ab
Fantoom	2277	2607	2055	6938 ab
Magella	1817	2997	2117	6931 ab
Antrim	1248	3481	2179	6908 ab
Svea	2741	2193	1810	6744 ab
Parcour	1346	3547	1761	6653 ab
Contender	838	3542	2178	6557 ab
Riikka	2271	2596	1580	6446 ab
Hella	1961	2887	1582	6430 ab
Valinge	2175	2606	1640	6420 ab
Lamora	1512	2695	2081	6288 b
Premo	2754	1876	1530	6161 b
Barlet	1445	2880	1833	6157 b
Rathlin	1416	2746	1968	6130 b
Gambit	893	3417	1792	6101 b
Ensilo	1672	2743	1458	5873 b
Norlea	1636	2927	1299	5862 b
Vigor	588	3210	2053	5851 b
Condesa	740	3125	1955	5820 b
Wendy	962	2970	1757	5689 b

Duncan's Multiple Range Test (P=0.05), two means followed by the same let'er are not significantly different.

EVALUATION OF FORMIC ACID PRESERVED-ANNUAL RYEGRASS FOR HAYLAGE

Gerald Robinson, Co-operating Farmer
Jack van Roestel, Crops Extension Specialist

This is the second of a three year study being done at Gerald and Helen Robinson's farm, near Shubenacadie. The objective is to conduct a comprehensive analysis of using a Westerwolds annual ryegrass as a high energy, stored feed alternative to corn silage and perennial clover/grass forages on heavy clay loam soils.

In reading this objective, the main question that may arise is; why would anyone switch corn and grassland acreage over to produce annual ryegrass for haylage? After all, the Westerwolds ryegrass has significant yearly tillage, seeding, fertilizer, and harvesting costs associated with it because it is an annual crop that requires lots of nitrogen and 4-5 cuttings for optimal performance.

In the Robinson's case (which is fairly unique in the province) it's hoped the annual ryegrass can economically replace clover/grass haylage and corn silage because;

1) Their heavy Queens clay loam soils are not well suited to corn production. Past experience with corn silage resulted in harvesting problems, poor yields, compacted soil and rutted fields.
2) The annual ryegrass isn't cut for the 1st time until mid-July, thus spreading out the cropping schedule so he can do approximately 2,000 acres of custom haylage harvesting work primarily in June.
3) Ryegrass also should intensify production/ha., allowing the sale of surplus perennial grass haylage to an established local market, and lastly,
4) This crop produces a consistent high quality haylage (18% + Protein, 67-70% T.D.N.) which can keep off-farm purchased feed costs down to 8-10% of milk sales. This would be 3 times better than the provincial average.

Table 1: Results of 2-Year Haylage Comparison of Ryegrass vs. Clover/Grass Mix

	Crop Quality**					
Crop*	% Protein	% ADF	% TDN	Yield (DM t/ha)	Prod. Costs/ha	Cost/tonne***
'87 Ryegrass	22.5 (14)	30.3	65.5(14)	6.7	$ 999/ha	$150/t
'87 Clover/ grass	16.2 (3)	33.6	61.1 (3)	3.9	$ 452/ha	$116/t
'88 Ryegrass	17.4 (6)	30.6	65.0 (6)	7.8	$1195/ha	$153/t
'88 clover/ grass	not available yet			8.1	$ 451/ha	$ 56/t

* there were 4 and 2 cuts of the ryegrass and perennial clover/grass mix, respectively. The '87 yields of both crops were down markedly because of a severe drought during July-September period.

** the bracketed ( ) value in the forage quality columns represents the number of samples analyzed.

*** the '88 ryegrass cost/tonne versus the '88 perennial forage was much higher because of annual tillage and seed, high fertilizer (327-95-199 of N-P-K) and formic acid costs. Formic acid was used on all '88 ryegrass harvests because of unfavourable weather conditions for wilting, and because ryegrass is extremely difficult crop to wilt with a high occurrence of butyric silage spoilage if not treated.

Conclusions to date

The cows have milked extremely well (25-27 kg/cow/day herd average) on the formic acid preserved-annual ryegrass haylage. There were no herd health problems providing the ryegrass was fed in combination with a small amount of dry hay and a high magnesium based mineral.

The extra milk production attributed to the feeding of ryegrass haylage, however, does not pay for the extra tillage, seed, harvesting and formic acid costs associated with this crop based on the '88 cost/tonne scenario.

In 1989, however, we are confident that the '88 ryegrass cost/tonne of $153.00 can be reduced by 30% or more through no till seeding, growing the vastly superior Aubade variety instead of Marshall, and reducing nitrogen fertilizer/formic acid rates.

The formic acid has done a good job in preserving the ryegrass haylage by instantly lowering the pH to 4.2 once it's sprayed on the crop at the harvester. The acid has been very safe to use and non-corrosive once the proper applicator was purchased.

The final report on this project will appear in next year's booklet upon completion of the 1989 cropping season.

CAPE MABOU COMMUNITY PASTURE SPECIES DEMONSTRATION

Peg Cummings, Crop Specialist,
Eric Bosveld, Soil and Crop Specialist

Location: Cape Mabou

Soil Analysis:

pH	O.M.	P_{20_5}	K_20	Ca	Mg
6.4	11.4	332H	153M-	3158M	700H

Soil Type: Sandy Loam
Preceding Crop: Mixed Forage Pasture
Seed Date: July 7, 1988
Block Size: 1 ha
Design: Unreplicated
Preparation: 2.0 L/ha Roundup (June 24)
Plowed, disced, chain harrowed
Brillion seeded
Fertilization: 350 kg/ha 17-17-17 - Prior to seeding

Cape Mabou, Inverness County, serves as a community pasture for many producers in Cape Breton. There are 500 acres of pasture, and over 500 head of cattle are pastured here from late May to late September.

Three one hectare blocks were seeded to three separate pasture mixes to determine a mix that will persist and yield well in this area. Data and observations will be taken in the spring and summer of 1989.

The following mixtures were seeded

Block I -	Sacremento White Clover	2.0 kg/ha
	Frode Orchardgrass	6.0 kg/ha
	Bastion Perennial Rye	15.0 kg/ha
Block II -	Sacramento White Clover	2.0 kg/ha
	Frode Orchardgrass	6.0 kg/ha
	Mimer Meadow Fescue	15.0 kg/ha
Block III -	Sonja White Clover	1.7 kg/ha
	Frode Orchardgrass	10.0 kg/ha

There was a heavy buttercup and lady's thumb weed infestation of all blocks. By early August, there was 2-3 cm growth, with block I showing the thickest stand. In late September, grass and weed growth was prolific (15-20 cm), and it was decided to graze all three blocks to reduce annual weed competition and reduce top growth in preparation for winter. The Sacramento white clover in blocks I and II was very thin as compared to Sonja white clover in block III, which was more prolific, although the clover catch of all blocks was disappointing. The aggressive establishment of the orchardgrass apparently out-competed the white clover.

Yields (pasture cages), quality, regrowth and species persistance data will be taken in 1989 with the aim of making pasture mix recommendations for quality pasture.

LUNENBURG COUNTY FORAGE ESTABLISHMENT TRIAL

A.J. Wilson,
Soil & Crop Specialist

Objective: To compare annual and perennial forage establishment with and without a cover crop during the establishment year.

Procedure: Eight different treatments, replicated four times for their effect on productivity.

The treatments were as follows:

1. Leger @ 150 kg/ha with 75 kg N.
2. Leger @ 150 kg/ha with 100 kg N.
3. Leger @ 150 kg/ha Maris Leger @ 25 kg/ha
4. Maris Leger 30 kg/ha
5. Leger, Maris Leger, Felix @ 150, 30 and 12 kg/ha
6. Leger, Bastion Marino @ 150, 4 and 6 kg/ha
7. Bastion, Alouette @ 4 and 10 kg/ha
8. Leger, Bastion, Alouette @ 150, 4 and 10 kg/ha

Leger - barley
Maris Leger - annual ryegrass
Felix - Persian Clover (annual)
Marino - red clover (double cut)
Alouette - alfalfa
Bastion - perennial ryegrass

Plots were sown on the 16th of May, 1988.
Fertilizer applications were as follows:

May 16, 1988	300 kg/ha 17-17-17
Post Emergence	75 kg/ha N on Leger Plot 1
Post Emergence	100 kg/ha N on Leger Plot 2

All ryegrass non legume plots 50 kg/ha N post emergence.

Second cut 300 kg 5-10-30.

Forage Establishment Trial

	Cut 1			Cut 2			Cut 3		
Cultivar	kg/ha	% P	% TDN	kg/ha	% P	% TDN	kg/ha	% P	% TDN
Leger-Maris Leger	2528	15	73	1448	19	71	3672	19	71
Leger-Maris Leger, Felix Clover	2240	17	73	1129	20	73	2883	15	73
Maris Leger	977	24	77	1257	22	73	2735	17	72
Leger, Bastion, Marion Clover	2299	16	73	1325	18	73	587	20	68
Leger, Bastion, Alouette	1718	18	74	1313	19	72	1079	18	72
Leger, 75 N	2070	20	75	1288	20	72	00	00	00
Leger, 100 N	1730	21	74	1223	20	73	00	00	00
Bastion Alouette	00	00	00	1145	23	72	1103	17	71

Forage Establishment Trial

Cultivar	Total Cut 1, 2 and 3 kg/ha	% P	% TDN	Replacement $ Value P & TDN
Leger-Maris Leger	7648	18	72	1865
Leger-Maris Leger-Felix clover	6252	17	72	1482
Maris Leger	4969	20	73	1287
Leger Bastion Marino clover	4211	17	72	1019
Leger Bastion Alouette	4110	18	73	1028
Leger 75N	3358	20	74	881
Leger 100N	2953	21	74	785
Bastion Alouette	2248	20	72	581

Dollar value based on corn at $202.82/tonne 48% soybean meal $448.10/tonne.

Harvest Date: Cut 1 - July 4/88; Cut 2 - Aug. 4/87; Cut 3 - Dec. 3/88.

Discussion:

By adding a cereal to annual ryegrass in 1987 the yield of the first cut was nearly triple that of ryegrass alone. (Wilson 1987)*. Similar results were achieved in 1988. In 1988 yield of the second cut of the ryegrass and barley plot was higher than the second cut of Maris Leger. The barley did not suppress the second cut of ryegrass.

The barley added value of $578.00/ha while adding a cost of only $34.00/ha for a net gain of $544.00 over ryegrass without a cover crop.

This trend held true for establishing the Alouette-Bastion mix. Adding Leger barley to the mix added $413.00/ha.

The plots were hit by a heavy frost towards the end of May that severely set back the barley. It seemed the Leger plots with the high rate of N were hurt more than those with lower rate of N. Nitrate levels were low for all N rates, but frost damage and leaching rains may have contributed to the low Nitrate levels.

Conclusion:

Over a two year period, the addition of barley cut pre heading has helped to establish clean forage stands and to increase productivity in the year of establishment.

Long term effect of using a cover crop on perennial forage yields are still to be determined. Lunenburg Soils & Crops Association plan to measure the effect of different sowing rates of a cover crop on perennial forage mixture in future trial work with establishment year beginning 1989.

* Wilson 1987 - Annual Forage Trial, Soils and Crops Project Results 1987, Page 22.

CUMBERLAND CO. PERENNIAL PASTURE SPECIES EVALUATION

Tyler & Lorraine Fisher, Co-operating Farmer
Ralph Murray, Agricultural Representative

The following is a summarized version of the '88 project report prepared by the above mentioned authors.

Background

Tyler Fisher, a local dairy farmer, came to us in 1986 expressing the need to get more production from his pasture, because he had a very limited land base. Due to a lack of proven pasture species, we suggested a project to evaluate several different pasture mixtures, with cost-sharing assistance provided under the Atlantic Livestock Feed Initiative Program.

The following species were planted on May 12th, 1987, on a 6-ha. field. The soil type is a Tormentine/Pugwash sandy loam with several wet spring spots throughout the field. The size of the individual grazing blocks varied from 1 to 1.6 hectares.

BLOCK # 1 Bastion Perennial Ryegrass, plus Ladino Clover
BLOCK # 2 Frode Orchardgrass, plus Ladino
BLOCK # 3 Frode Orchardgrass, Johnstone Tall Fescue and Ladino
BLOCK # 4 Trader Meadow Fescue, Farol Timothy and Ladino

Due to the extremely dry summer of 1987 and fluffy seedbed, blocks # 1 and 2 had to be reseeded on June 12th of that year, to ensure sufficient crop production for the succeeding years of the project. As a result, no yields were taken in 1987. However, 37 grazing days were still possible and some general observations on growth and cow acceptance were noted. These were reported in the 1987 Interim Report, which is on file.

The evaluation parameters are "square yard" cage samples, to determine dry matter yields, including crude protein, total digestible nutrients and acid detergent fibre; cow grazing days vs. milk yield and a costs/returns analysis. The project co-ordinators - Tyler and Lorraine Fisher were responsible for taking the yield samples, and recording the sample weights and grazing days. In addition, they fertilized*, clipped and rotated the paddocks as required.

Table 1: 1988 Dry Matter & Quality Yield Data**

Block #	D.M. Yield (kg/ha)	% Protein	% T.D.N.	% A.D.F.
1	10,300	17.4	65.6	30.1
2	10,600	17.6	63.7	31.8
3	12,600	17.5	63.2	32.0
4	14,000	15.1	60.4	34.3

* In '88 the plots were fertilized with 333 kg/ha of 17-17-17 (spring) and 190 kg/ha of 18-6-18 (mid summer).

** Yields were taken during each grazing rotation, blocks 1 & 3, and Blocks 2 & 4 were sampled four and five times respectively.

OBSERVATIONS

Block # 1 (Bastion Perennial Ryegrass & Ladino Clover)

The Bastion perennial ryegrass looked to be completely winterkilled this spring. However, it regenerated amazingly well from the plant base (crown), after fertilization and warmer weather. The Bastion had the lowest fibre and subsequently the highest T.D.N. percentage. However, the protein content and dry matter yields were low compared to the other mixtures. Reasoning for this would be the slow spring start and inadequate nitrogen fertility (only 90 kg/ha of chemical Nitrogen and less organic N due to lowest Ladino clover content of the 4 blocks).

The winter hardiness and persistance of Bastion is still relatively unproven outside the Annapolis Valley Region.

Block # 2 (Frode Orchardgrass & Ladino Clover)

The orchardgrass and Ladino had the second lowest dry matter yield at 10,600 kg/ha and the second highest quality next to the ryegrass. However, the orchardgrass growth got ahead of the cows and had to be clipped twice.

Block # 3 (Frode Orchardgrass, Johnstone Tall Fescue & Ladino)

In terms of overall yield and quality, this mixture appears to be the best. However, much of the extra yield increase came from the Johnstone Tall Fescue, but the cows generally tended to graze the Orchardgrass & Ladino, while leaving much of the less palatable Johnstone fescue. As a result, the Tall Fescue growth got out of control, necessitating two clippings of this paddock.

Block # 4 (Trader Meadow Fescue, Farol Timothy & Ladino)

This block had the highest dry matter yield, 14,000 kg/ha., but the lowest quality. The Trader Meadow Fescue appears to be crowding out the Farol Timothy. The lower palatability can be readily seen, while watching the cows graze. When moved into this paddock, they would go to the native bluegrass and wild timothy on the fringe. Only after grazing the fringe area did they move into the seeded paddock.

CONCLUSION

Data on the project will be collected for another year. The final report based on 2 years grazing evaluation with concluding statements and costs/returns analysis will be included in next year's report.

INVERNESS CO. FORAGE CUTTING DATE STUDY

Eric Bosveld, Soil and Crop Specialist
Peg Cummings, Crop Specialist

Concern has been expressed by farmers that the optimum harvesting date of forages for Cape Breton Island may not be the same as on the mainland. Subsequently, as requested by the directors of the Inverness SCIA, a forage cutting date study was initiated to determine its affect on both quality and yield of locally grown forages.

Five co-operators were chosen with various species at several locations in the county. Each co-operator was asked to leave a small portion of a selected field unharvested so that square meter yields and quality samples could be taken periodically.

Selected areas within each field were chosen for their uniformity and were intended to be representative of the field. Starting on June 7, yield determinations were made and fresh forage samples were taken for lab analysis, and this continued on a more or less weekly basis for the remainder of the month.

Table 1 describes the species and varieties used in the trial and briefly summarizes the fertility applied.

Table 1: Varieties, Species and Fertility of 1988 Forage Cutting Date Study

Co-operator	Species & Variety as Seeded	Year Seeded	Spring Fertility	Total N (kg/ha)
1. Danford Murphy - Mabou	Iroquois alfalfa/ Frode Orchardgrass (40% alfalfa by ground area)	1977	200 kg/ha 5-20-20 applied mid May.	10
2. John Austin - Skye Glen	5% Marino red clover 5% Huia white clover 50% Clair Timothy 15% Alsike clover 10% Tetraploid-perennial ryegrass 15% Meadow fescue (by weight)	1987 (@ 14 lbs /ac.)	275 kg/ha 34-0-0 applied the last week of May.	93.5
3. Jim Austin - Skye Glen	Frode Orchardgrass	1983	165 kg/ha 34-0-0 applied May 14 + 50 m^3 /ha dairy manure applied in fall of 1987.	76.1

Table 1 continued.....

continuation of Table 1.

Co-operator	Species & Variety as Seeded	Year Seeded	Spring Fertility	Total N (kg/ha)
4. Gary VandenHeuval - Brook Village	40% Clair Timothy 45% Marino red clover 5% California Ladino clover 10% Frances perennial ryegrass (by weight)	1987 (@ 16 kg /ha)	400 kg/ha 17-17-17 + 24 m^3/ha manure applied fall 1987.	78
5. Leo Cox - Mabou	Basho Timothy	1986	300 kg/ha 17-17-17 1st week of May.	51

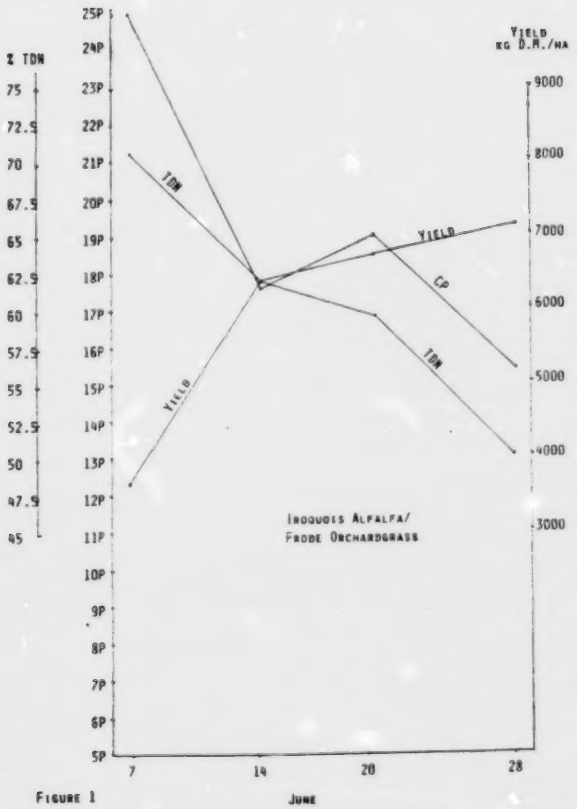


Figure 1

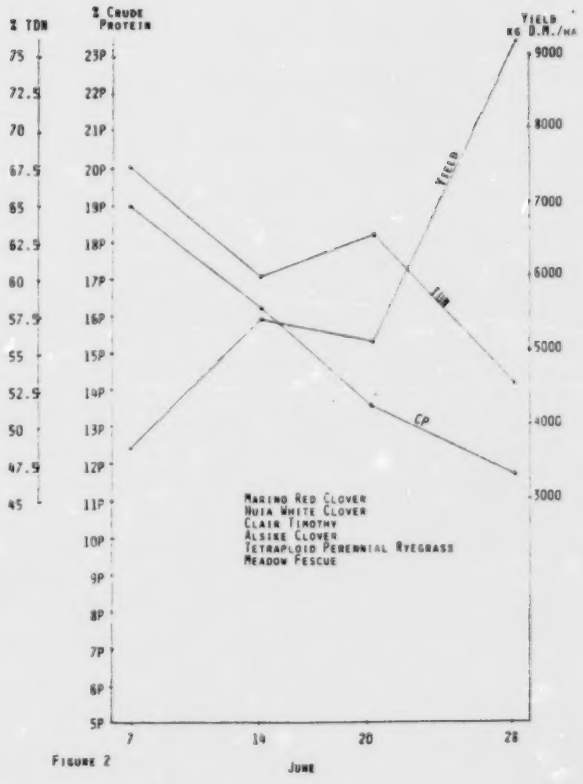


Figure 2

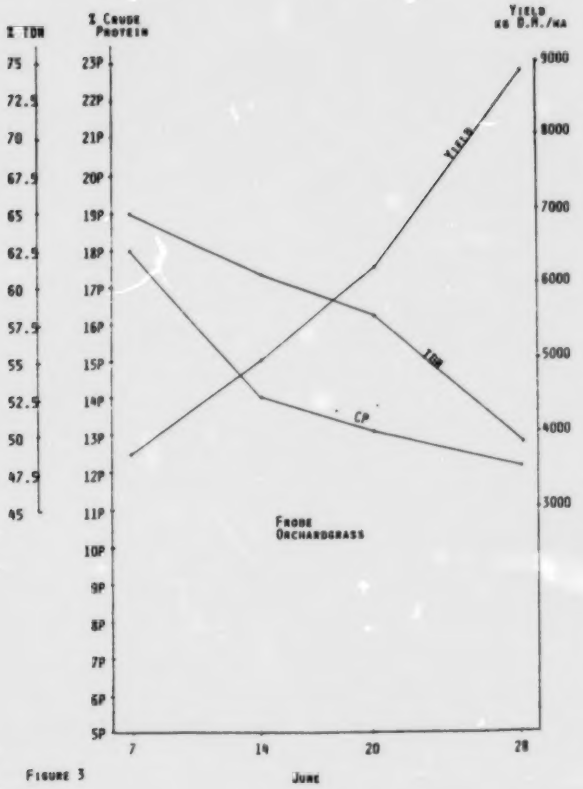


Figure 3

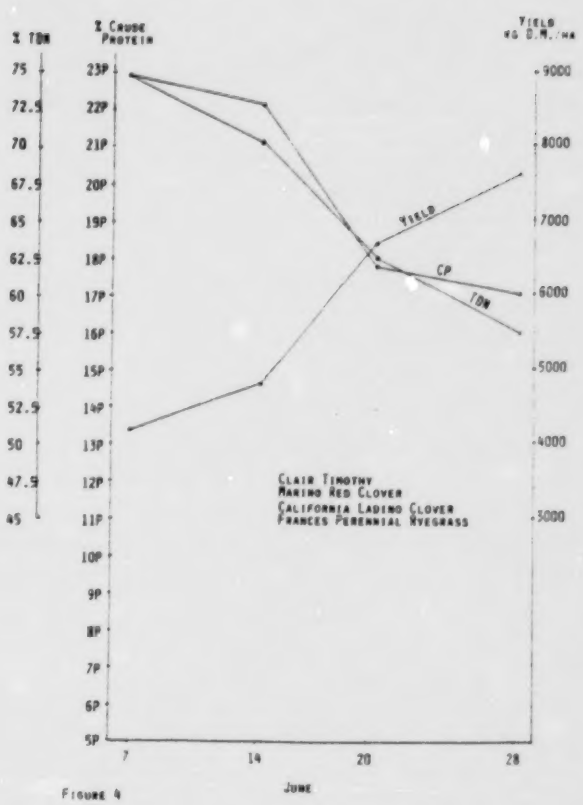


Figure 4

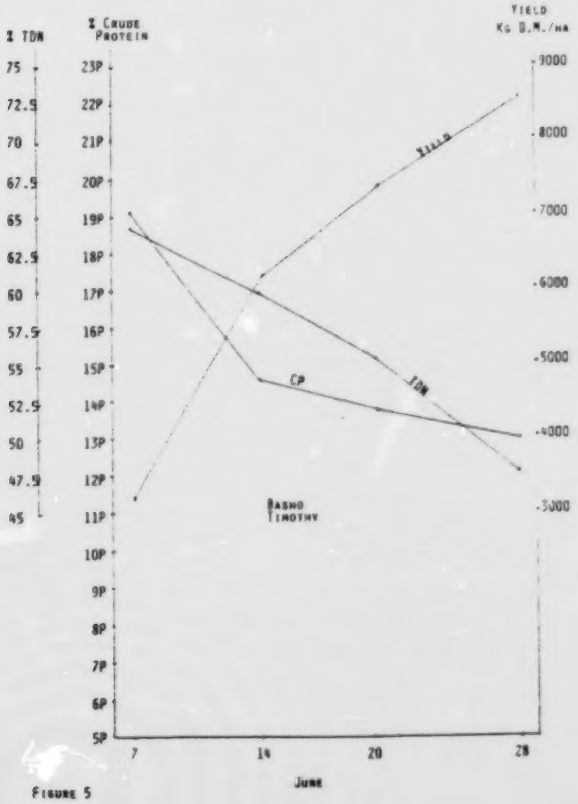


Figure 5

Alfalfa/Orchardgrass (Danford Murphy i.e.: Figure 1)

The protein level increased from June 14 to June 20 with Iroquois alfalfa© Frode Orchardgrass mixture (Figure 1), but this is likely due to a higher percentage of alfalfa taken in the fresh forage sample or a higher percentage of alfalfa in the area where the square meter yield was taken.

The alfalfa yield graph is about as "classic" as possible, with a rapid increase early in the month and reduced increases after June 14th. The quality of this stand dropped rapidly after June 7th and therefore it should be cut as close to this date as possible, to capitalize on the high energy and protein levels. The yield increased 1.9 times or nearly doubled over the three week period but 78% of the yield increase occurred in the week of the 7th. Therefore, delaying harvest after June 14th had little affect on yield but a tremendous negative affect on the quality. The last possible date of harvest in order to obtain a high quality forage (+15% C.P., + 60% TDN) was approximately June 10th, due to potential and probable losses in energy, resulting from the wilting, harvesting and storing operations.

Mixed Forage (John Austin, i.e. Figure 2)

The energy levels of the mixed forage at John Austin's (Figure 2) increased between June 14th and 20th and the yields decreased according to the results presented. The most plausible explanation for the reduction in yield is the high degree of lodging that occurred between these dates and subsequently the difficulty experienced in taking accurate square meter yields on the 20th. The discrepancies in energy levels of these two dates is attributable to the complexity of the seeded mixture and/or the sampling method. Natural variations in soil type and drainage can result in different species predominating different parts of a field, especially if there is a wide variety of species in a mixture. In all probability, a higher percentage of a high energy species (white clover or perennial ryegrass) was taken in the forage sample on the 20th. This could be due to sampling procedure or there was actually a higher percentage of these species in the area where the square meter yields were taken on the 20th.

If the June 20th data is excluded, the losses in energy and protein and the increases in yield would be nearly linear. To obtain a high quality forage (+60% TDN, + 15% C.P.), harvest in the spring of 1988 would have had to occur around June 10th with this mixture with yield at approximately 4500 kg D.M./ha. The yield of this mixture continued to increase dramatically throughout the sampling period (2.5 times).

Frode Orchardgrass (Jim Austin, i.e. Figure 3)

The Frode orchardgrass at Jim Austin's (Figure 3) dropped from 18% crude protein on June 7th to 14% crude protein just 7 days later: 0.57% crude protein percentage points per day, which is 1.7 times faster than the average crude protein loss for all species and mixtures during the 21 day period. Approximately 70% of the crop had headed out by the first sampling date and it

was fully headed out a week later. The decline in the protein level after June 14th was less rapid (0.14% C.P./day). The loss in energy was similar to the other mixtures and species, but had already dropped to 65.0% T.D.N. by the 7th of June.

The yield of the orchardgrass more than doubled over the three week period (2.4 times). It is important to remember that the yield is not lost if the crop is cut early, since orchardgrass has excellent regrowth and the June growth could be capitalized on by an early second cut (and a third cut in many years).

Frode orchardgrass would have had to be harvested by the 7th of June to obtain a high quality forage (15% C.P., 60% T.D.N.) when potential wilting, harvesting and storing losses are considered.

Mixed Forage (Gary VandenHeuval i.e. Figure 4)

The forage at Gary VandenHeuval's (Figure 4) was a nice mixture of ladino, red clover and perennial ryegrass. For the amount of Timothy included in the mixture (40% by weight) only a small percentage appeared to be well established. The protein and energy levels were excellent on the first sampling date with a very respectable yield potential. The energy and protein dropped rapidly between the 14th and 20th (1.25% T.D.N. and 0.73% C.P. per day) and the yield increased at approximately 316 kg D.M./ha/day. The latest date of harvest in which a high quality forage could be obtained would have been June 18th. This field was harvested on June 14th which resulted in an excellent quality forage.

Basho Timothy (Leo Cox, i.e. Figure 5)

The Basho Timothy at Leo Cox's (Figure 5) declined in protein rapidly between June 7th and 14th. (0.65 C.P. percentage points per day) and was 10% headed out by June 20th. The decline in protein was less rapid after the 14th. The loss in energy was nearly linear for the 21 day period and averaged approximately 0.75 percentage units per day.

The yield increased dramatically during the period (2.7 times) and was most rapid early in the month. If the field was harvested on or before the 7th of June it would have resulted in a high quality forage (if good conditions had existed) but serious stand thinning could occur since the buds on the corns would have not been sufficiently developed. Subsequently, for long timothy stands, harvest should occur at the late boot to early heading stage, even though the quality will be less than ideal.

Table 2: Quality Loss Over 21 Day Period (June 7-28)

	Species	% TDN June 7	% TDN June 28	Average Daily TDN Loss	% C.P. June 7	% C.P. June 28	Average Daily CP Loss
1.	Alfalfa/ Orchardgrass	70.6	50.5	0.96%	25.1	15.5	0.46%
2.	Red Clover, White Clover, Timothy, Alsike Clover, Perennial Ryegrass, Meadow Fescue	68.1	53.1	0.71%	19.0	11.8	0.34%
3.	Orchardgrass	65.0	49.9	0.72%	18.0	12.1	0.28%
4.	Timothy, Red Clover, Ladino, Perennial Ryegrass	74.7	57.9	0.80%	23.0	17.1	0.28%
5.	Timothy	64.0	48.3	0.75%	19.1	12.9	0.30%
	Average	68.5	51.9	0.79%	20.8	13.9	0.33%

Summary

The loss in TDN averaged 0.79 percentage units per day for all mixtures and species with the highest rate of loss occurring in the alfalfa/ orchardgrass mix at close to a full percentage point per day. The average loss of crude protein was 0.33 percentage points per day for all species and again the highest losses were incurred by the alfalfa/orchardgrass mix at nearly 0.5% C.P./day. This may be attributable to the age of the stand (11 years) since the leaf: stem ratio of alfalfa declines over time.

All mixtures had decent to excellent energy and protein levels when sampled on June 7th and undesirable levels by the 28th of June. Since the samples taken were of fresh forage, the results presented are in fact higher than would be experienced on the farm, because no losses occurred due to respiration, harvesting and storing.

The yield increases over the three week period were dramatic with an average increase of 2.3 times for all species and mixtures. Timothy yields increased 2.7 times, whereas the alfalfa/orchardgrass mix and the timothy/ perennial ryegrass/ladino clover/and red clover mix nearly doubled (1.9 times). Since fresh forage weights were taken, yield losses incurred during the normal wilting, harvesting and storing operations, are not indicated and therefore actual on-farm yields would be somewhat lower.

In order to determine the optimum harvest date for any mixture, certain definitions must be made. In this case, high quality was defined as +15% crude protein and 60% T.D.N. and these levels were used to determine the optimum date. Also, it must be remembered that these results may be somewhat different in other years and due to the methodology of the study, one must exercise care in forming conclusions. However, it has indicated trends and the observations made have served a benefit in demonstrating the need for early harvest of forage mixtures in Inverness County.

PICTOU CO. SCIA FORAGE DEMONSTRATION SITE

Eric Bosveld,
Soil and Crop Specialist

Location:	Durham, Pictou Co.
Preceding Crop:	Orchardgrass
Plot Size:	5m x 5m
Design:	Unreplicated
Seeding Date:	June 24, 1988
Harvest Date:	August 29, 1988
Co-operator:	Arnold (Junior) Cock

Soil Analysis:	pH	O.M.	$P_2 0_5$	$K_2 0$	Ca	Mg
	7.0	5.1	698(H+)	571(H+)	3651(M)	950(H+)

Fertilizer: 100 kg/ha 17-17-17

Last spring the Directors of the Pictou Co. Soil and Crop Improvement Association decided they would like to examine the performance of some of the new varieties of forages under local conditions. In response to this a small plot, unreplicated field demonstration was set up on the farm of Junior Cock's.

The Site

The Land Evaluation and Planning Service (LEAPS) staff from the Soils and Crops Branch surveyed the site on May 12, 1988. Detailed information was collected on soil particle size, restricting layer depth and type, stoniness, major horizons, etc. The soil was determined to be of the Morristown soil series with small pockets of deeper Hansford soils. The Morristown soil has a coarse loamy texture and was found to have a compacted basal till 51 to 65 cm from the soil surface. The Hansford soil is also a coarse loam but no restricting layer was found. The slope of the site ranged from 3 to 11% and it is considered to be moderately well drained.

Site Preparation and Seeding

Orchardgrass was plowed down in the spring and Roundup was applied in May at 11.5 l/ha (6% solution in backpack sprayer) to control an infestation of couchgrass. A light harrowing was used to prepare the seedbed and to incorporate the fertilizer. Rolling occurred before and after seeding to ensure good soil-seed contact and to conserve moisture (since the seeding occurred late, the risk of poor germination and seedling establishment was high). The plots were seeded by hand.

Establishment and Seedling Vigor

Lamb's quarters initially became a small problem but due to the level of infestation, it was easier to pull them than to spray. The level in the plowed area outside the plots became heavily infested with Lamb's quarters and these were not pulled. (it looked as if they were in the plots from the road when in fact the plots were relatively weed free).

The four Sonja white clover mixtures established very nicely since there was adequate moisture and heat. The Red Clover mixtures also established nicely and were 15-20 cm high by July 28 (5-10 cm higher than Sonja). Apica alfalfa also exhibited excellent seedling vigor and was 30-40 cm high by the same date.

The plots were harvested on August 29, using the square meter technique, and fresh forage samples were taken for lab analysis. The results are reported in Table 1.

Yields were high for the establishment year, especially since it was seeded late. It must be remembered that when using the square meter technique for yield determinations no losses are incurred by the normal cutting, wilting, harvesting and storing operations. Therefore in reality, the actual on-farm yields would be somewhat less. Also when seeding small plots by hand, it is especially difficult with small seed to spread it evenly over the 5m x 5m area. Subsequently, the yields and quality may vary somewhat within a plot in the establishment year. However, it is possible to draw certain conclusions regarding the establishment of the mixtures based on this demonstration;

1. The alfalfa mixtures outperformed the red and white clover mixtures and yields were improved when a grass was included, especially if it was Timothy.

2. The Sonja white clover mixtures in which orchardgrass was included, yielded better than when either meadow fescue or perennial ryegrass were included.

3. The red clover/Timothy mixtures outyielded the Triple mix.

4. When Johnstone Tall fescue hybrid was included in the Sonja pasture mix, the protein and the energy were reduced.

It is important to realize that these results are from one site in one particular year and may or may not be directly applicable to other years and locations. However, the results do indicate certain trends which are useful observations.

Table 1: Establishment Year Yields and Quality

Plot	Seeding Rate (kg/ha)	Yield (kg DM/ha)	% T.D.N. (DM basis)	% Crude Protein (D.M. basis)
1. Bastion perennial ryegrass	25	2759	60.9	22.2
Sonja white clover	2.5			
2. Mimer meadow fescue	15	2929	64.2	24.8
Sonja white clover	2.5			
3. Kay orchardgrass	6	3480	49.3	18.1
Johnstone tall fescue hybrid	15			
Sonja white clover	2.5			
4. Kay orchardgrass	8	3920	61.8	22.3
Sonja white clover	2.5			
5. Mistake that contains Marino red clover Bird's foot Trefoil	?	3216	61.0	21.5
6. Kay orchardgrass	9	4050	58.4	22.4
7. Venture Reed Canary grass	8	3094	64.2	23.1
Marino Red clover	6			
8. Basho timothy	4	3960	58.3	20.7
Marino red clover	6			
9. Climax timothy	4	3690	60.0	21.5
Florex red clover	6			
10. Borden's special Triple Mix	15	3197	60.6	21.3
11. Basho timothy	2	6510	63.5	21.8
Apica alfalfa	12			
12. Saratoga bromegrass	11	5238	63.3	24.2
Apica alfalfa	11			
13. Apica alfalfa	13	4564	56.3	23.6

HARDWOODLANDS FORAGE DEMONSTRATION AND TEST SITE, EST. 1986

Bill Thomas,
Provincial Forage Specialist

The Hardwoodlands Forage Demonstration and Test Site was established in 1986 at the request of the Halifax-East Hants Federation of Agriculture. The Federation wanted various recommended varieties and mixtures to be evaluated on poorly drained, finely textured soils.

The site is located on the property of Scothorn Farms Ltd., Hardwoodlands, on the corner of Highway # 14 and MacDonald Road.

There are three mixture trials and three cultivar evaluation trials at the site. This is the second year of the three year project which hopes to help determine those mixtures and cultivars which perform best on heavy texture, poorly drained soils.

Hay Mixtures - Grass-Legume

All the mixtures in this trial were seeded as 80% grass and 20% legume. The highest yielding plot in both 1987 and 1988 contains just straight champ timothy. The plot was seeded down as a mix of timothy and alsike, but the alsike died out late in the establishment year. Plots containing timothy and red clover produced slightly less yield than straight timothy, but were much higher in quality. The Bromegrass/Red Clover plot appears to be maintaining the highest content of Red Clover. The fact that Bromegrass is not as competitive as other grasses could be a possible explanation for this observation.

Location: Scothorn Farm - Hardwoodlands
Experimental Design: Randomized complete block design
Plot Size: 5m x 1.5m
No. of Treatments: 10
No. of Replicates: 3
Date of Seeding: May 29, 1986
Fertilizer: May 5 34-0-0 @ 250 kg/ha
July 12 34-0-0 @ 250 kg/ha
Aug. 9 17-17-17 @ 250 kg/ha
Sept. 29 0-0-60 @ 250 kg/ha

Mixtures
80% Grass
20% Legume

	Harvest Date June 14 1988			Harvest Date Aug. 9 1988			
	D.M. Yield	%C.P.	TDN	D.M. Yield	%C.P.	TDN	Total D.M. Yield
Champ Timothy	6167	16.6	57.6	4091	15.3	55.4	10258 a
Vantage Reed Canary Prosper Red Clover	5378	19.3	62.6	4403	16.4	58.9	9780 ab
Climax Timothy Prosper Red Clover	5158	18.8	66.5	4458	12.6	55.0	9616 abc
Carlton Brome Prosper Red Clover	5522	17.4	65.2	3726	14.2	57.1	9248 abcd
Basho Timothy Prosper Red Clover	4594	18.2	65.1	4357	15.0	56.2	8951 bcd
Kenhy Tall Fescue Prosper Red Clover	4548	17.5	68.3	4348	17.3	58.1	8896 bcd
Venture Reed Canary Prosper Red Clover	5002	13.9	57.7	3753	15.3	57.4	8755 bcd
Saratoga Brome Prosper Red Clover	5380	21.5	63.3	3232	17.4	60.5	8612 cd
Frode Orchard Prosper Red Clover	4679	15.6	62.9	3638	15.9	54.8	8317 de
Trader Meadow Fescue Prosper Red Clover	3964	14.3	67.7	3428	15.4	59.0	7393 e

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

Haylage Mixtures - Grass-Legume

All the haylage mixtures contain 80% legume and only 20% grass. Though the mixture of Prosper red clover and Frode orchardgrass produced the highest yield, no one mixture "significantly" out-yielded any other. In retrospect it would have been better if these mixtures contain a higher percentage of grass. A mixture of 60% red clover and 40% grass would have been superior.

Location: Scothorn Farm - Hardwoodlands
Experimental Design: Randomized complete block design
Plot Size: 5m x 1.5m
No. of Treatments: 10
No. of Replicates: 3
Date of Seeding: May 29, 1986
Fertilizer:
May 5 5-10-30 @ 300 kg/ha
July 12 18-6-18 @ 250 kg/ha
Aug. 9 0-0-60 @ 250 kg/ha
Sept. 29 0-0-60 @ 250 kg/ha

Mixtures
80% Legume
20% Grass

	Harvest Date June 14, 1988			Harvest Date Aug. 9, 1988			
	D.M. Yield	% C.P.	TDN	D.M. Yield	% C.P.	TDN	Total D.M. Yield
Prosper Red Clover Frode Orchardgrass	5186	13.1	58.2	3612	16.3	54.8	8798 a
Prosper Red Clover Kenhy Tall Fescue	4637	17.0	62.8	3996	15.9	59.0	8633 a
*Canada # 1 Alsike Champ Timothy	5257	12.9	59.8	3332	13.2	53.5	8589 a
Prosper Red Clover Basho Timothy	4486	15.0	65.1	4037	14.8	55.5	8523 a
Prosper Red Clover Climax Timothy	4274	19.4	59.7	4159	15.7	50.7	8433 a
Prosper Red Clover Vantage Reed Canary	4827	18.5	67.7	3347	17.2	57.5	8174 a
Prosper Red Clover Venture Reed Canary	4574	18.2	66.8	3482	17.5	54.5	8056 a
Prosper Red Clover Saratoga Brome Grass	4853	15.7	61.8	3149	16.8	55.2	8002 a
Prosper Red Clover Carlton Brome Grass	4468	14.3	58.4	3525	15.3	54.9	7993 a
Prosper Red Clover Trader Meadow Fescue	4347	15.7	64.1	2897	17.4	56.9	7244 a

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

* Alsike clover establishes quickly, but does not persist. The alsike component did not persist into 1987. This mixture can be considered as a straight timothy.

Pasture Mixtures

In order to evaluate these mixtures as to their pasture suitability, the plots were harvested four times. Due to wet field conditions the first harvest did not take place until mid-June. Mixtures containing a tall fescue, timothy or reed canary grass outyielded other mixtures in 1988 because of the late first cut. The delay in cutting until mid-June allowed the taller growing grasses to produce the bulk of their yield at first cut. The plots containing orchardgrass, meadow fescue and perennial ryegrass did not produce as large a first cut yield, but did produce more consistently over the growing season.

Location:	Scothorn Farm - Hardwoodlands
Experimental Design:	Randomized complete block design
Plot Size:	5m x 1.5m
No. of Treatments:	10
No. of Replicates:	3
Date of Seeding:	May 29, 1986
Fertilizer:	May 5 34-0-0 @ 250 kg/ha
	July 17 34-0-0 @ 250 kg/ha
	Aug. 9 18-6-18 @ 250 kg/ha
	Sept. 30 0-0-60 @ 250 kg/ha

Mixtures	1st Cut June 14			2nd Cut July 12		
	D.M. Yield	% C.P.	TDN	D.M. Yield	% C.P.	TDN
Venture Reed Canary, Champ Timothy, Ladino	6783	16.4	54.6	956	17.2	70.6
Johnstone Tall Fescue, Champ Timothy, Ladino	6489	14.0	58.6	1077	20.6	72.2
Kenhy Tall Fescue, Champ Timothy, Ladino	6328	12.8	54.2	1162	16.9	70.2
Trefoil, Champ Timothy, Ladino	5821	14.0	53.0	1216	16.8	69.9
Palaton Reed Canary, Champ Timothy, Ladino	6547	13.4	52.3	993	16.8	68.3
*Triple Mix (Timothy, Red Clover, Alsike)	5211	15.9	57.4	1121	19.0	68.6
Trader Meadow Fescue, Champ Timothy, Ladino	5366	13.0	62.0	967	17.5	70.2
Frode Orchardgrass, Champ Timothy, Ladino	4972	15.2	57.1	1117	21.8	72.9
Riikka Perennial Ryegrass, Champ Timothy, Ladino	4065	13.8	58.3	1100	15.8	67.6
Norlea Perennial Ryegrass, Champ Timothy, Ladino	4138	15.0	58.4	1040	16.8	67.8

* The alsike clover component established quickly, but did not persist past the first year. This mixture can be considered as a straight red clover/timothy mix. Triple mixtures containing alsike are usually lower in yield and quality after the establishment year than the more simple mix of red clover/timothy.

Mixtures	3rd Cut Aug. 9			4th Cut Sept. 30			
	D.M. Yield	% C.P.	TDN	D.M. Yield	% C.P.	TDN	Total D.M. Yield
Venture Reed Canary, Champ Timothy, Ladino	1610	18.6	66.3	2696	12.9	70.1	12044 a
Johnstone Tall Fescue, Champ Timothy, Ladino	1382	16.5	66.8	2772	13.3	70.6	11719 ab
Kenhy Tall Fescue, Champ Timothy, Ladino	1507	17.2	67.7	2653	12.7	69.2	11651 abc
Trefoil, Champ Timothy, Ladino	1976	16.6	64.8	2501	12.5	69.8	11514 abc
Palaton Reed Canary, Champ Timothy, Ladino	1540	16.3	61.0	2321	17.9	73.3	11400 abc
Triple Mix (Timothy, Red Clover, Alsike)	2007	18.2	64.2	2318	14.5	70.4	10657 bcd
Trader Meadow Fescue, Champ Timothy, Ladino	1502	15.5	66.9	2556	13.1	68.5	10390 cd
Frode Orchardgrass, Champ Timothy, Ladino	1490	15.6	63.2	2438	13.9	66.9	10017 d
Riikka PRG Champ Timothy, Ladino	1511	17.2	63.8	2855	15.6	74.5	9531 de
Norlea PRG Champ Timothy, Ladino	1495	20.0	67.0	2570	14.4	72.6	9243 e

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

Timothy

Location: Scothorn Farm - Hardwoodlands

Plot Size: 5m x 1.5m

Experimental Design: Randomized complete block design

No. of Cultivars: 5

No. of Replicates: 4

Date of Seeding: May 28, 1986

Fertilizer:
May 5 34-0-0 @ 250 kg/ha
July 12 34-0-0 @ 250 kg/ha
Aug. 4 18-6-18 @ 250 kg/ha
Sept. 30 0-0-60 @ 250 kg/ha

Cultivar	Harvest Date June 14/88 D.M. Yield	Harvest Date August 1988 D.M. Yield	% C.P.	T.D.N.	Total D.M. Yield
Champ	7154	4347	15.5	56.5	11501 a
Basho	6511	4575	15.9	57.4	11086 ab
Climax	6392	4009	15.5	54.4	10401 b
Salvo	6473	3679	16.3	57.6	10152 bc
Farol	5558	3671	17.7	57.8	9229 c

Duncan's Multiple Range Test (P=0.05), two means followed by the same letter are not significantly different.

PROVINCIAL FORAGE DEMONSTRATION SITE, TRURO, EST. 1985

Bill Thomas,
Provincial Forage Specialist

The Provincial Forage Demonstration Site at Truro was established in 1985 to display many of the forage species and mixtures recommended for Nova Scotia.

In 1988, the highest yielding species on a two cut system was timothy.

There are four timothy cultivars growing at the site; Salvo, Basho, Climax and Farol. There was no appreciable difference in yield between Salvo, Basho and Climax, which outyielded Farol at first cut by approximately 1 tonne. Farol is a very late timothy. It does not head out until the second week of July. Out of necessity, this plot was harvested along with the other plots on June 20th, three weeks before it's anticipated heading date, resulting in a smaller than capable first cut and therefore seasonal yield. The very late flowering characteristic of Farol makes it more suitable for inclusion in pasture mixtures than other timothies.

The two meadow fescue hybrids Prior and Elmet along with the perennial ryegrass Norlea, all suffered from winter injury in 1988. Though first cut yields were low due to winter injury, all three grasses recovered well by the end of June. The two meadow fescue hybrids and the perennial ryegrass Norlea had the highest quality at both harvests. Such consistency in quality is a very desirable characteristic.

Location: Brookside, Truro, N.S.
Established: 1985
No. of Plots: 22
Plot Size: 4 x 16 meters
Fertilizer: May 10, 1988 Grasses 34-0-0 @ 250 kg/ha
Mixtures 34-0-0 @ 150 kg/ha
Legumes 5-10-30 @ 300 kg/ha
July 8, 1988 70% Grass 34-0-0 @ 250 kg/ha
70% Legume 18-6-18 @ 250 kg/ha

	June 7* June 20			Aug. 31			
	D.M. Yield kg/ha	% C.P.	TDN	D.M. Yield kg/ha	% C.P.	TDN	Total D.M. Yield kg/ha
Bromegrass	5414	11.1	64.8	2603	13.3	62.7	8017
*Orchardgrass	4083	15.3	68.9	3849	9.9	54.9	7932
Reed Canary Grass	5650	13.6	66.6	2923	12.7	63.2	8573
Timothy Salvo	7855	13.3	57.4	2794	12.0	66.3	10649
Timothy Basho	7691	11.8	60.4	2634	9.7	66.6	10325
Timothy Climax	7410	10.6	56.1	3183	12.1	63.2	10593
Timothy Farol	6676	11.2	56.7	3049	11.2	62.4	9725
Reed Canary & BFT	5173	11.3	56.6	2933	15.0	65.9	8106
Timothy & BFT	6995	13.7	58.9	3269	12.8	60.9	10264
Kenhy Fescue &BFT	7655	11.7	57.0	3688	25.5	67.6	11343
Single Cut Red Clover	6581	14.2	66.2	2517	16.7	63.1	9098
Kenhy Fescue Hybrid (TF x IRG)	3495	11.1	63.7	1541	8.2	66.6	5036
Johnstone Fescue Hybrid (TF x IRG)	3457	13.4	68.5	2792	9.8	67.1	6249
*Meadow Fescue	3981	15.5	67.5	2852	11.7	61.8	6833
Elmet Meadow Fescue Hybrid (MFx IRG)	1830	16.4	68.8	2471	17.6	63.5	4301
Prior Meadow Fescue Hybrid (MF x PRG)	2958	16.2	69.4	1984	17.4	64.0	4942
*PRG Norlea	2399	15.9	78.0	2638	14.8	61.6	5037
*Creeping Red Fescue	3521	14.8	71.1	2525	11.6	59.5	6046
Alfalfa-Rambler	6813	12.3	51.2	2949	12.3	54.9	9762
Double Cut Red Clover Prosper I	4836	11.2	60.3	2488	14.1	60.0	7324

PROVINCIAL FORAGE DEMONSTRATION SITE
LOWER CANARD, EST. 1985

Bill Thomas,
Provincial Forage Specialist

Provincial Forage Demonstration Site at Lower Canard, Kings County, was established in 1985. Yield data on these various forage species and mixtures has been recorded since 1986.

Generally forage yields were higher in 1988, than in 1987. Abundant rainfall and high temperatures were good for forage re-growth, but made harvesting more difficult.

Being the third harvest year there was considerably less red clover present in 1988 than in previous years. It is interesting to note though, that the prosper hay mix which contains just red clover and timothy continues to be superior in yield and quality to the Maritime triple mix (composed of red clover, timothy and alsike). It is thought that the lower yield and quality of the triple mix is due to the alsike clover component. It has been observed that alsike clover has the same effect as an annual weed in the mixture. Alsike produces a vigorous seedling that out competes the red clover seedlings during establishment and then dies out in the fall. The result is less clover in the forage mix during production years.

The higher red clover content in the double mix is responsible for its higher yield and higher quality.

Dispite this fact, Maritime triple mix is the most popular forage mixture sold in Nova Scotia.

These demonstration plots are open for viewing from mid May until October.

Forage Demonstration Plots

Location: Lower Canard, Kings County, Nova Scotia
Established: 1985
No. of Plots: 14
Plot Size: 3 x 5 meters
Fertilizer: May 9 70% Grass 34-0-0 @ 250 kg/ha
70% Legume 5-10-30 @ 300 kg/ha
June 22 Grasses 18-6-18 @ 350 kg/ha
Mixtures 18-6-18 @ 250 kg/ha
Legumes 0-0-60 @ 200 kg/ha
Sept. 21 All plots 0-0-60 @ 200 kg/ha

	June 9			August 5			Sept. 16			
	kg/ha	% C.P.	TDN	kg/ha	% C.P.	TDN	kg/ha	% C.P.	TDN	Total Yield
Alfalfa	4603	18.1	59.4	3413	16.7	57.9				8016
Prosper R.C.	4273	15.9	62.1	2198	12.9	62.4				6471
Ladino Clover	3143	12.3	65.8	2510	13.9	61.0	932	19.6	75.2	6585
Bromegrass	4497	13.0	66.3	3125	13.6	61.4				7622
Kenhy Tall Fescue	4028	14.0	63.7	3623	10.8	61.6	1061	10.7	66.2	8712
Vantage R.C.	4803	17.5	64.7	4714	10.9	57.9				9517
Timothy	5366	16.7	60.8	3753	14.1	58.3				9119
Prosper Hay Mix (Red Clover & Timothy)	7005	15.9	61.2	4758	13.5	55.0				11763
Triple Mix	6917	15.1	60.1	4578	12.2	54.3				11495
Orchardgrass	4956	13.5	63.0	4134	13.5	56.9	1197	13.7	64.4	10287
Meadow Fescue	3731	15.4	60.3	3409	14.5	59.3	1386	13.5	69.7	8526
Pasture Mix (Orchardgrass, Kenhy & White Clover)	5697	13.7	58.9	3946	12.1	55.2	1578	14.1	67.2	11221

WHITE CLOVER FROST SEEDING PROJECT

Eric Bosveld,
Soil and Crop Specialist

Location: Scotsburn, Pictou Co. **Co-operator:** Sandy Stewart

Soil Analysis:	pH	O.M.	P_2O_5	K_2O	Ca	Mg
	6.8	6.5	175(M+)	145(M-)	4409(M+)	739(H)

Seeding Date: April 4, 1988
Seeding Rate: 3.6 kg/ha
Design: Unreplicated field size
Fertilizer: 330 kg/ha 17-17-17 (May 1)
220 kg/ha 17-17-17 (July 16)

Capital investments in tillage equipment and high fuel costs can make the plowing and reseeding of pastures expensive. Also due to the topography of some pastures, the difficulty in establishing improved species conventionally may be overwhelming. Farmers have reported varied results with frost seeding of legumes to renovate forage land, therefore the directors of Pictou Co. SCIA decided it would be a worthwhile endeavour and a demonstration trial was set up at Sandy Stewart's in Scotsburn.

In 1981 a 1.2 hectare field was seeded to a Triple Mix and hayed for 3 years. By 1984 the clovers were virtually gone and the field was pastured for the next three years. An infestation of dandelions became a problem (and some Tansy Ragwort), and it was sprayed with 2,4-D in the fall of 1987, which effectively removed the remaining clover and weeds. The grass cover was reduced by a late grazing before the onset of winter, the pH was high, and there were reasonable levels of soil P and K, which all served as preparation for the frost seeding.

On April 4, 1988, 3.6 kg/ha of Sacremento Ladino Clover was broadcast on part of the pasture with a "cyclone seeder" and a small portion was left unseeded. The weather conditions were good and within a week there was one decent frost and approximately 45mm of rain.

After approximately one month, the seedlings had started to grow and the catch in most areas appeared to be relatively good. An application of 330 kg/ha 17-17-17 was made in early May.

On June 7th, square meter yields and quality samples were taken, and although the seedlings were present, they had not developed much since the previous visit. Subsequently the Ladino white clover did not contribute to the pasture quality or yield as presented in the following Table 1.

Table 1: Frost Seeding Yields and Quality (June 7)

	Treatment	Yield (kg D.M./ha)	TDN (D.M. basis)	Crude Protein (D.M. basis)
1.	Unseeded	2354	72.0%	21.3%
2.	Seeded	2240	73.5%	18.4%

On July 28, yield and quality samples were taken for a second time, and are presented in Table 2.

Table 2: Frost Seeding Yields and Quality (July 28)

	Treatment	Yield (kg D.M./ha)	TDN (D.M. basis)	Crude Protein (D.M. basis)
1.	Unseeded	1609	63.8	20.9
2.	Seeded	1688	65.9	20.1

There were no improvements in yield or quality due to the frost seeding. On the July 28th sampling, the white clover present was determined to be a wild species, since equal amounts could be found in parts of the unseeded area and the leaf size was too small to be Ladino. Therefore the question arose as to the ratio of wild white clover to Ladino seedlings present in the first sampling. This question cannot be totally answered, but it is clear that many Ladino clover seedlings established in the early spring. In all probability, due to the fertility applied in early May, the grass out-competed the young Ladino seedlings. The first grazing did not occur until June 13 (due to excellent growth in other pastures) and perhaps the shading and competition that occurred were detrimental to the newly established plants.

The use of 2,4-D in the fall tremendously improved this pasture. When yields were calculated using the number of grazing days, average dry matter intake, and the number of grazing cows, it was determined to be a respectable 7042 kg D.M./ha (including fall grazings).

A frost seeding demonstration will be attempted again next year with the following treatments.

1. seeded/fall sprayed (2,4-D)
2. unseeded/fall sprayed (2,4-D)
3. unseeded/no spray
4. conventionally seeded pasture mix

It will be suggested that the amount of nitrogen in the early spring application be reduced (perhaps 12-24-24 instead of 17-17-17) and that the first grazing occur earlier, to help reduce the competition from the grass. It was also decided to seed a little earlier next year to obtain more frost action, and hopefully better establishment.

FORAGE ESTABLISHMENT

A.J. Wilson,
Soil & Crop Specialist

Co-operators: Herman Mentink
John Lawrence
Halifax Seed Co. Ltd.

Objective:

To look at forage establishments using a cover crop at one site and no cover crop at the other. Also, to compare three seed treatments to a control and then look at their effects on alfalfa establishment and disease control.

Procedure:

The two sites chosen were; one at John Lawrence's, Annapolis County and Herman Mentink's, Kings County.

A cover crop of Leger barley was used in Annapolis County, while no cover crop was used in Kings County. Prillion-coated and non treated seed was supplied by Halifax Seed Company. One-third of the non treated seed was inoculated, one-third was inoculated and treated with Anchor seed treatment, and the remaining one-third was left untreated.

Anchor seed treatment is a soybean seed treatment containing a sticker and an equal proportion of Thiram and Carbathlin. Thiram helps control Verticillium Wilt and Carbathlin controls damping off.

The rate used was 150 ml of Anchor/25 kg of seed.

Plots were sown the third week of May.

Plots in Annapolis County were established using cattle manure. No fertility was applied to the plots in Kings County.

SITE 1
Annapolis County

Alfalfa:	13 kg/ha
Fertilizer:	manure
Cover crop:	Leger @ 95 kg/ha
Herbicide:	Nil
Harvest:	2 cuts: July 12: Sept. 21/88
Stage of Cut:	1st cut - Barley Boot stage 2nd cut - Alfalfa 10% Bloom

	Yield t/ha	% P	TDN	Replacement Value
Cut 1	2	16	56	409.00
Cut 2	3.6	22	75	999.00
	5.6			1408.00

SITE 1
Annapolis County

Cost:	Barley	$45.00
	Treflan	-
	2,4-DB	-
Total Material Cost		$45.00
Received		$1408.00
Harvest Costs		-$336.00
Net		1027.00

Using a cover crop and no herbicide in this case contributed $1,000.00 per hectare in the establishment year.

Yields were taken on August 24, 1988 at the Lawrence site with the following results:

Treatment	kg/ha	% P	% TDN	$ Replacement Value TDN & P
Inoculated	3000	22	77	843.00
Control	2940	22	75	815.00
Prillion coated	2730	22	77	767.00
Anchor	2640	25	77	791.00

Dollar value based on corn @ $202.82/tonne and 48% soybean meal at $448.10/tonne.

SITE 2
Kings County

Alfalfa:		13 kg/ha
Fertilizer:		nil
Cover Crop:		nil
Herbicide:		Treflan
		2,4-DB
Harvest:		nil
Cost:	Barley	-
	Treflan	$12.00
	2,4-DB	$20.00
Total Material cost		$32.00
Received		-
Harvest costs		-
Net		- $32.00

Site #2 had to be clipped because of weed escapes. As a result no harvest was taken resulting in a negative return in the establishment year.

Comments:

In the establishment year, the inoculated at Site # 1 outperformed the other treatments. At Site # 2 because of weed contamination no yields were taken.

PROJECT TT54

A.J. Wilson,
Soil and Crop Specialist

HAY DESSICANT TRIAL

Co-operator: Gordon Zwicker

Objective:

To purchase, install and operate a sprayer applicator for forage drying agents comparing two (2) brands of drying agents.

Dessicants:

What are they? Dessicants or drying agents are commonly made up of potassium carbonate. They are used mainly for drying alfalfa. Usually a spray boom is mounted on the mower. The spray is directed towards the stem of the plant. In theory, the drying agent removes the waxy film from the surface of the stem of alfalfa allowing the alfalfa to dry more rapidly.

Procedure:

A conventional 3-point hitch mount hardy sprayer was purchased. The sprayer came equipped with a 12-volt pump to be used for applying dessicant. A second boom came with the sprayer for mounting on a haybine. 110015 flat fan nozzles spaced at 25 cm were used for spraying the dessicant. A push bar was mounted below the boom to allow better penetration.

Three commercial dessicants were used: Agridri for grass, Emerdri I and Emerdri I-II. The site used consisted of a 50-50 alfalfa grass stand.

Agridri for grass was added to 130 litres of water to deliver a rate of 7 kg/ha of Agridri at 30 PSI or 207 KPA. Agridri was applied and the sprayer was cleaned. This process was repeated for Emerdri I. 12.5 kg of Emerdri I and 16 litres of Emerdri II were mixed to deliver 4.1 kg of Emerdri I and 5 litres of Emerdri II per hectare. No spray was used on the control strip (Figure I).

The recommended PSI for applying dessicant is 60 PSI or 411 KPA. 30 PSI was used because that is all the sprayer would deliver.

It was felt that 30 PSI was too low to deliver the penetration needed to cover the hay. The sprayer was re-piped to give better bypass control. This enabled 50 PSI or 345 KPA to be achieved.

The trial was repeated using Agridri applied at 50 PSI delivering 9 kg/ha on a 50-50 grass alfalfa mixture (Figure II).

For each experiment 1 sq. meter section of wire mesh trays were used for measuring D.M. Four one square meter sections were cut from each treatment and placed on the weighing trays. D.M. measurements were taken throughout the trial for the purpose of obtaining drying times.

Results and Discussions:

Loss of moisture correlated very well with increased temperature and periods of Low Relative Humidity but was not affected by dessicant applied at the rates used in this trial.

It should be noted that the Agridri rate at 6 and 9 kg/ha are low rates and can be increased and still remain in the recommended range.

Conclusion:

Periods of Low Relative Humidity and high temperature occurs during the daylight hours. Most drying occurs between 09:00 and 21:00 hours with very little drying occurring between 21:00 hours and 09:00 hours.

There wasn't any correlation between dessicant and reduced drying time.

PROJECT TT 58 - HAY DESSICANT TRIAL

A.J. Wilson,
Soil and Crop Specialist

Co-operator: Bob Wilson, Falmouth, N.S.

Objective:

To test spray rates and boom design for applying a hay dessicant.

Procedure:

A John Deere 2-wheel drive tractor was equipped with saddle tanks. Each tank was mounted so that it could be used independent of the other.

Tank A was filled with a mixture of Emerdri I and II to deliver 12.5 kg of Emerdri I and 16 litres of Emerdri II on 3 hectares at 300 L/ha.

Tank B was mixed to deliver the same amount of Emerdri I and II per hectare using 150 L/ha of solution.

The tractor was equipped with a control unit with the capability to control three booms independently.

Boom Design:

The push bar on the haybine was used to mount three booms. The three booms were mounted in line (figure 2) and controlled by the control unit mounted on the tractor.

Each boom was equipped with 3-way nozzles (Figure 3) and color coded so that different sized nozzles could easily be identified.

Boom one (single): Nozzles were spaced 30" (75 cm.) apart on the push bar and angled 45^{o} forward.

No. 11006 nozzles were placed in one nozzle receptacle and color coded with black caps.

At 4.5 m.p.h. (7.5 km/ha) and 60 p.s.i. (400 KPa) this boom delivered 300 L/ha and was used with tank A. This boom was controlled by the left position on the control unit.

Boom two (double & single): A second line was run along the push bar and controlled by the centre position on the control unit. 11006 nozzles were placed in one nozzle receptacle of the nozzles on the second line and the first line, and color coded with green caps. Two nozzles on boom one had to be plugged and labelled with green caps.

When all green caps were in the working position on boom one and two and the remaining black caps on boom one, a 20" (50 cm.) spacing was achieved.

The center and left position on the central unit had to be activated in order for this boom to work.

Boom two was used with tank A and a working pressure of 30 p.s.i. (200 KPa) and ground speed of 5.1 m.p.h. (8.5 k.p.h.) a delivery of 300 L/ha.

Facing one-half of the nozzles forward and one-half to the rear at 45° angles gave a 40" (100 cm.) spacing between nozzles faced to the front and 40" nozzles faced to the rear, but only a 20" spacing between nozzles.

Boom three: 11003 nozzles were placed in the third nozzle receptacle on lines one and two and color coded with a red cap. At 30 p.s.i. and 5.1 m.p.h., and using Tank B, boom three delivered 150 L/ha. This boom was operated only in the double boom position.

Haybine Alterations:

A second push bar was added to the haybine sloped 45° forward and hung 18" below the original push bar. The purpose of the second push bar was to allow spray to coat the stem of the alfalfa.

Test Procedure:

Starting with boom one, strips were sprayed in an over matured alfalfa field. All booms were used, plus a control strip.

Four one-square-meter sections were cut from each spray treatment plus the control. These sections were moved to wire mesh screens and the weight recorded on a regular basis (Figure 1).

Results:

The control bale turned very moldy; as a result a sample was not sent for analysis.

In spite of the high pH, the other two bales kept very well (Table 1).

Table 1. Forage Analysis

Treatment	% P	% TDN	pH
control	White mold throughout		-
Emerdri (bale 1)	16	44	5.7
Emerdri (bale 2)	22	55	5.5

In 20 hours the swaths sprayed with the single and the double boom using the 300 L/ha rate were ready to bale and to be put on a barn dryer. The control swath and the swath sprayed by the double boom using 150 L/ha were ready at 28 hours.

At twenty hours, samples were taken and three bales were rolled up and ensiled. The control tested 51% D.M. and the Emerdri 48.4. In the swath the difference in drying time noticed on the trays was not apparent.

Conclusions:

Due to the inconsistant results from drying trays to field condition, it would not be appropriate to draw any conclusion at this time. This experiment needs to be run again with all samples being taken directly from the swath and not from drying trays before one can access the commercial viability for drying agents for our region.

WEST HANTS PASTURE TRIAL

A.J. Wilson,
Soil & Crop Specialist

Co-operators: Mr. Garnet Zillig,
Mr. Peter Marsh & Sons

Objective:

To evaluate pasture species for winter survival and productivity in a non-replicated trial in Hants County.

Procedure:

Five mixtures were planted in the spring of 1985 at Garnet Zillig's, Scotch Village. The mixtures were as follows:

1) Kenhy-Frode Orchardgrass (30-70) 1 kg/ha of Ladino was added

2) Bison ryegrass-fescue cross

3) Ensilo perennial ryegrass

4) Kenhy-Ladino

5) Kenhy-Frode Orchardgrass (50-50)

The Bastion & Ensilo plots along with the Ladino clover winter killed the first winter. Bison and Ensilo plots were harrowed and reseeded to Johnstone tall fescue and Bastion perennial ryegrass on May 26, 1987.

At Peter Marsh & Sons on May 18, 1987 a 50-50 mixture of Tetralite ryegrass-Johnstone tall fescue was planted along with Johnstone tall fescue and Tetralite perennial ryegrass.

Fertilization:

Peter Marsh & Sons	Garnet Zillig
Fertilization in both years include the following:	
Early spring 150 kg/ha 17-17-17	July 1st 200 kg/ha 17-17-17
Post emergence 150 kg/ha 34-0-0 x 3	
Fall 4.4 t/ha lime	

Results:

The results were as follows:

Peter Marsh & Sons*

Cultivar	1987 (Seeding Year) kg/ha	$ P & TDN	1988 kg/ha	$ P & TDN	2-year Total $/ha
Tetralite	4579	1208	3491	882	2090
Johnstone	3821	1093	5671	1516	2609
Tetralite-Johnstone (50-50)	3672	910	3988	1041	1132

Garnet Zillig

Kenhy-Orchard (30-70)	5854	1182	5810	1505	2687
Kenhy-Orchard (50-50)	4627	816	5658	1438	2254
Kenhy	4403	865	5190	1264	2489
Johnstone	2903	309	5190	1235	1544
Bastion	1698	386	4195	1157	1543

	Harvest Date 1987	Harvest Date 1988
Cut # 1	June 4, 1987	May 24, 1988
Cut # 2	June 29, 1987	June 13, 1988
Cut # 3	July 24, 1987	July 12, 1988
Cut # 4	Aug. 10, 1987	Oct. 6, 1988
Cut # 5	Oct. 5, 1987	

Dollar Value Based On:

1987 Corn @ $147.80/t 48% soybean meal @ 408.64

1988 Corn @ $202.82/t 48% soybean meal @ $448.10/t

* Harvest started July 20, 1987

Discussion:

At Garnet Zillig's the mixture of Kenhy-Orchardgrass (30-70) plus 1 kg of Ladino outperformed the other mixtures. The Orchardgrass-Ladino is much quicker to establish than the Kenhy tall fescue. Thus, the mixture yields more than Kenhy alone. The major drawback to both Ladino and Orchardgrass is that they are susceptible to winterkill. Sonja White clover is more winter hardy than Ladino and may prove to be a better clover in this mixture.

Johnstone at other sites hasn't yielded as well as Kenhy and the trend was the same here.

At Peter Marsh and Sons and Tetralite outperformed the Johnstone in the seeding year. This is to be expected as Tetralite is a ryegrass and Johnstone a fescue. But in year two and over the two year period, the Johnstone outperformed the Tetralite due to its better winterhardiness.

EVALUATION OF A VREDO NO-TILL FORAGE SEEDER

Jack van Roestel,
Crops Extension Specialist

Re-establishing superior forage species in runout pasture and hayland can be an expensive task from a tillage standpoint. However, eight Kings County farmers have developed a project under the A.L.F.I. Agreement to evaluate a machine that will hopefully reduce these re-seeding costs and still produce a high yielding stand. This group will be testing the Vredo no-till forage drill over a three year period on various soil and cropping situations. The Vredo drill, manufactured in Holland, can seed forage directly into stubble or sod ground, eliminating the tillage practices associated with a conventional Brillion seeding approach.

In 1988, the Vredo drill was used on a total of 54 ha. (135 ac.) in Kings County. The project co-operators used this machine to establish or inter-seed annual ryegrass, alfalfa and pasture mixtures on herbicide-suppressed sod or existing hayland. (See Table 1)

Table 1: Vredo No-Till Forage Establishment in 1988

H. Mentink (Grand Pre)
- May 10 & 11th (12.8 ha. total)
- Field #1, upland soil, fall Round-up and seeded to 80:20 alfalfa-grass
- Field #2, dykeland soil, annual ryegrass in '87, no Round-up, seeded to alfalfa-ladino clover-grass mix
- both fields yielded about 5 t/ha (2 t/ac.) of Dry Matter in an early September cut, however, Field #2 had a much better legume catch than Field #1. Field #1 had poor alfalfa establishment due to slow emergence and wild annual grass & clover competition

D. Conrad (Grand Pre)
- May 13, July 13 and September 6 (24 ha. total)
- several fields, upland soil, interseeded legume-grass mixture into existing hay & pasture stands for rejuvenation, no Round-up used
- too early to evaluate, interseeded seeded fields won't show any amount of new forage species until next spring.

Davison's/Dabro Farm (Gaspereau)
- May 22, 23 (4 ha.) pasture field, upland soil, spring Round-up, seeded perennial ryegrass - meadow fescue-ladino clover pasture mix into sod.
- good pasture stand establishment with a superior mixture. This field has "rock outcropping" in places. Not the sort of piece you would want to plow.

P. Wiersma (Bishopville)
- June 2 and August 15 (12.8 ha.)
- Field #1, upland soil, spring Round-up and seeded annual ryegrass into tough pasture sod.
- Field #2, upland soil, no Round-up, late summer interseeding (immediately following 2nd cut) of orchardgrass-timothy mix into existing hay stand.
- the annual ryegrass stands had about a 60-80% catch and yield. The Lemtal variety did tiller out to compensate, the Aubade didn't. Establishment was inhibited by slow emergence & perhaps inadequate nitrogen fertilizer.

- Field #2 is a similar situation to the Conrad fields, where the inter-seeding success will best be evaluated in the spring of '89.

Observation to Date: As you can see from the above listing, the Vredo machine was used in various cropping situations with different degrees of success in 1988. It's premature to draw any conclusions on the no-till drill at this time, however, there are a few operation tips we've picked up from our first year's experiences. These are:

1) for better stand establishment, always use Round-up. Spring application is more desirable than fall. Fields should have old sod, fall disced to stimulate couchgrass rhizomes for better Round-up control.

2) more attention needs to be given to seeding depth. Some of the slow emergence and weak establishment could possibly be avoided with shallower seed placement.

3) seed later in spring. Perhaps a late May-early June seeding date would be more desirable than 2-3 weeks earlier. This would allow soil temperatures to increase, hasten crop emergence and produce more aggressive seedlings that could compete with possible annual grass weed problems.

There has been interest in the Vredo machine from farmer groups in Hants, East Hants and Cumberland Counties. We have told these groups, that based on our field experience in 1988, another years plantings would be necessary before we would recommend or condemn this drill/seeding approach.

Field Work Planned for '89: It is hoped that the drill will be used on another 40-80 ha. (100-200 ac.) next year, particularly on the four co-operators that haven't used it yet.

The drill will also be loaned for a brief period to forage trial work at the Field Crops Expo '90 site in Sheffield Mills.

Finally, it is hoped that we can have yield measurements gathered at two sites; a) H. Mentink's Vredo Field #1 & 2 versus conventional seeded alfalfa fields all established in '88 and b) Dabro's Vredo pasture established in '88 established pasture.

Pictured are Herman Mentink and son, part of the Kings County group that are evaluating a Vredo seeder under an A.L.F.I. Project.

WINTER WHEAT
RATE OF SEEDING TRIAL

Dwane Mellish
Assistant Director

This was the 3rd year to test the effect of seeding rate on the yield of three winter wheat varieties with a range of tillering capacity evaluated under a management regime which minimized disease and lodging pressure.

The 1988 trial results are followed by the combined results for 1987-88 (1986 results were excluded due to field conditions which resulted in uneven plot development).

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy Loam
Seeding Date:	Sept. 8	**Harvest Date:**	August 10
Row Spacing:	15 cm	**Experimental Design:**	Split Plot
Plot Size:	6m x 1.25m		
Fertilization:	400 kg/ha 5-20-20 @ planting		
	200 kg/ha 34-0-0 @ ZGS 22		
	200 kg/ha 34-0-0 @ ZGS 30/31		
P.G.R.:	1.5 L/ha Cycocel Extra ZGS 30/31		
Herbicide:	1.5 L/ha Target ZGS 33		
Fungicide:	125 gai/ha Bayleton @ ZGS 30/31		
	125 gai/ha Tilt @ ZGS 45		
	500 gai/ha Bravo 500 @ ZGS 45 and @ ZGS 55		

1988 ANOVA TABLE FOR PARAMETERS MEASURED

	Winter Survival	Heads /m^2	Plant Height	1000 K.Wt.	Yield	Test Wt.
Variety	**	**	**	**	**	**
Seeding Rate	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Variety x Rate	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

YIELD OF GRAIN (t/ha)

Variety	Yield
Borden	3.9 a
Monopol	3.8 a
Vuka	2.4 b

Borden and Monopol (92 and 93% survival respectively) were the most winter hardy, while Vuka was significantly poorer (73%).

All observed parameters gave differences between the varieties with Borden (3.9 t/ha) and Monopol (3.8 t/ha) yielding significantly better than Vuka (2.4 t/ha).

No differences were observed due to seed rate. The lower seeding rates were able to compensate as can be seen by the lack of significant difference in head counts. Disease pressure, especially Septoria, had a significant effect on reducing differences due to seed rates.

ANOVA TABLE 1987-1988 COMBINED RESULTS

	Winter Survival	Heads /m^2	Plant Height	Test Wt.	1000 K.Wt.	Yield
Year	**	**	**	**	**	**
Variety	**	**	**	**	**	**
Year x Variety	N.S.	**	N.S.	N.S.	**	*
Rate	N.S.	**	N.S.	**	**	**
Year x Rate	**	N.S.	N.S.	N.S.	N.S.	**
Rate x Variety	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Year x Rate x Variety	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

The 1987 & 1988 results were combined. The two years were very different with 1987 being dry with low disease pressure, while 1988 was extremely wet and even with foliar fungicides the disease pressure, particularly Septoria was not adequately controlled.

RATE X YEAR

Year	Seeding Rate Seeds/m^2	Winter Survival %	Yield t/ha
87	100	56.3 e	4.8 d
87	200	68.3 d	5.5 c
87	300	65.4 d	5.9 b
87	400	72.9 cd	6.1 b
87	500	73.3 cd	6.2 b
87	600	77.5 bc	6.2 a
88	100	88.5 a	3.1 e
88	200	88.3 a	3.4 e
88	300	88.1 a	3.5 e
88	400	83.3 ab	3.4 e
88	500	82.5 ab	3.2 e
88	600	85.7 ab	3.6 e
LSD		8.2	0.4

Numbers followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

Seeding rate significantly affected head/m^2, kernel wt., test wt. and grain yield. Due to the growing conditions, 1987 results are probably more representative of what might normally occur. It is interesting to note the yield potential of even the lowest seeding rate when other management factors are taken care of.

Summary

Although the two years were vastly different in growing conditions, the Borden and Monopol consistently outyielded the Vuka. Beyond a seeding rate of 300 seeds/m^2 (15 cm row spacing) no significant yield increase was found.

The influence of seeding rates with narrower row spacing (less than 15 cm) may be different than found in this trial. The area of seeding rate influences at narrow row spacings warrants further investigation.

WINTER WHEAT SEED TREATMENT & DATE OF SEEDING

Dwane Mellish,
Assistant Director

The third year of a seed treatment study on winter wheat found a positive influence of some seed treatments on early spring mildew control and grain yield. The variety of winter wheat as well as planting date also had significant effects on these characters.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy Loam
Seeding Date:	Sept. 8	**Harvest Date:**	Aug. 10
	Sept. 22	**Row Spacing:**	15 cm
Plot Size:	6m x 1.25m	**Experimental Design:**	Split Plot
Fertilization:	400 kg/ha 5-20-20 @ planting		
	200 kg/ha 34-0-0 @ ZGS 22		
	200 kg/ha 34-0-0 @ ZGS 30/31		
Varieties:	Absolvent, Borden, Monopol, Vuka		
Herbicide:	1.5 L/ha Target @ ZGS 33		
P.G.R.:	2.0 L/ha Cycocel Extra @ ZGS 30		
Seed Treatments:	Check, Vitaflo 280, Baytan, Vitaflo 280 + 2454, Vitaflo 280 + Baytan		
Fungicides:	125 gai/ha Baytan @ ZGS 30/31		
	125 gai/ha Tilt @ ZGS 45		
	500 gai/ha Bravo @ ZGS 55		

When seeded on Sept. 8th the seed treatments had no significant affects on any measured factor.

	Winter Survival	Base Mildew ZGS 39	1000 K.Wt.	Yield	Test Wt.
Variety	**	**	**	**	**
Seed Treatment	N.S.	N.S.	N.S.	N.S.	N.S.
Variety x Seed Treatment	N.S.	N.S.	N.S.	N.S.	N.S.

Varietal differences did occur in all parameters measured. Vuka, with the lowest winter survival and lowest head/m^2 count, yielded the least.

When seeded on the late seeding date of Sept. 22nd seed treatment had a significant effect on heads/m^2, test weight and grain yield.

	Winter Survival	Mildew Base ZGS37	Head $1/m^2$	1000 K.Wt.	Yield	Test Wt.
Variety	N.S.	**	N.S.	**	**	**
Seed Treatment	N.S.	N.S.	*	N.S.	**	*
Variety x Seed Treatment	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

All seed treatments gave significantly improved readings over the non-treated check for heads/m^2 and test wt. The two seed treatments including Baytan gave the best grain yield.

SEPT. 22ND SEEDING - SEED TREATMENT

Seed Treatment	Heads /m^2	Test Wt. kg/hl	Yield t/ha
Check	380 b	62.7 b	3.3 c
Vitaflo 280	448 ab	63.5 ab	3.5 c
Baytan	417 ab	63.6 ab	3.8 ab
Vitaflo 280 + 2454	426 ab	63.9 a	3.6 bc
Baytan + Vitaflo 280	478 a	64.5 a	3.9 a
LSD	57.3	1.1	0.3

Numbers followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

The varieties differed significantly in plant height, 1000 k wt., test wt. and grain yield. Borden gave the highest yield of 4.7 t/ha.

When the data from both seeding dates are combined the seed treatment showed a significant effect on grain yield and early season mildew ratings. Variety had a significant influence upon most factors, however all varieties did not react the same at both seeding dates as indicated by the large number of variety by date interactions.

1988 - WINTER WHEAT EARLY & LATE SEEDING DATES COMBINED

	Winter Survival	Mildew % Base ZGS 37	Heads /m^2	Plant Height (cm)	1000 K.Wt.	Yield	Test Wt.
Date	**	*	N.S.	**	**	N.S.	**
Variety	**	**	**	**	**	**	**
Date x Variety	N.S.	*	*	*	**	**	*
Seed Treatment	N.S.	**	N.S.	N.S.	N.S.	*	N.S.
Date x Seed Treatment	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Variety x Seed Treatment	N.S.	N.S.	N.S.	N.S.	*	N.S.	N.S.
Variety x Seed Treatment x Date	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

When combined all seed treatments did better than the check, with the Baytan + Vitaflo 280 the best.

SEED TREATMENT AND SEEDING DATE GRAIN YIELDS

Date	Seed Treatment	Combined Yields Date 1 & Date 2 Yield	Yield
# 1 (Sept. 8)	Check	3.5 bc	3.4 b
# 1	Vitaflo 280	3.8 ab	3.6 ab
# 1	Baytan	3.5 bc	3.6 ab
# 1	Vitaflo 280 + 2454	3.7 ab	3.6 ab
# 1	Baytan + Vitaflo 280	3.9 a	3.9 a
LSD			0.3
# 2 (Sept. 22)	Check	3.3 c	
# 2	Vitaflo 280	3.5 bc	
# 2	Baytan	3.8 ab	
# 2	Vitaflo 280 + 2454	3.6 bc	
# 2	Baytan + Vitaflo 280	3.9 a	
LSD		0.26	

When both seeding dates were combined the second seeding date had a better survival across all varieties (88% vs. 82%), with Borden having the best survival (91%), followed by Monopol (89%), Absolvent (84%) and Vuka (77%).

When seeded at the later date varieties were consistently shorter in height, 1000 k.wt. was generally lower and yielded less except for Borden.

SIGNIFICANT INTERACTION (DATE X VARIETY)

Date	Variety	Heads /m^2	Plant Height	1000 K.WT.	Yield	Test Wt.
1	Absolvent	471	101	35.7	3.9	70.2
1	Borden	393	118	32.0	3.9	66.7
1	Monopol	481	96	30.0	3.9	66.6
1	Vuka	460	103	32.9	3.0	58.9
2	Absolvent	437	91	32.5	3.5	66.2
2	Borden	435	114	28.9	4.7	65.7
2	Monopol	430	91	29.8	3.5	65.3
2	Vuka	424	100	33.3	2.8	57.4

Winter conditions were somewhat unusual with no frost in the ground when snow cover occurred in late November. This resulted in considerable snow mold being present which may have attributed to the reduced survival of the early seeded wheat.

Seed treatments generally improved final yield overall with those seed treatments including the experimental compound Baytan showing the best results.

WINTER WHEAT
PRODUCTION MANAGEMENT TRIAL

Dwane Mellish
Assistant Director

This is an ongoing trial to test the response of winter wheat and triticale to four levels of management. This trial is repeated at five locations in the Maritime Region.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Spring Barley	**Soil Type:**	Sandy Loam
Seeding Date:	Sept. 8	**Harvest Date:**	Aug. 11
Seeding Rate:	400 K/m^2	**Experimental Design:**	Split Plot
Plot Size:	1.25 x 6m		
Fertilization:	All treatments @ planting 400 kg/ha 5-20-20		
Varieties:	Absolvent, Borden, Decade (Triticale), Monopol, Perlo, Vuke, F29-76		

Management Levels:

1)	Standard	150 N kg/ha 34-0-0 @ ZGS 22 150 N kg/ha 34-0-0 @ ZGS 30
II)	Additional N	75 N kg/ha 34-0-0 @ ZGS 22 75 N kg/ha 34-0-0 @ ZGS 30 50 N kg/ha 34-0-0 @ ZGS 45
III)	Additional N + Fungicide	125 gai/ha Bayleton @ ZGS 30/31 125 gai/ha Tilt @ ZGS 45 500 gai/ha Bravo @ ZGS 45 + ZGS 55
IV)	Additional N + Fungicide + P.G.R.	1.5 L/ha Cycocel Extra @ ZGS 30

ANOVA TABLE FOR PARAMETERS MEASURED

	Winter Survival	Heads /m^2	Plant Height	Lodging Harvest	Yield	Test Wt.	1000 K.Wt.	Protein
Management	N.S.	N.S.	**	**	N.S.	N.S.	N.S.	**
Variety	**	**	**	**	**	**	**	**
Management x Variety	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	*

SIGNIFICANT MANAGEMENT LEVEL DIFFERENCES

Management Level	Plant Height (cm)	Lodging Harvest (0.2-9)	Protein (%)
I	108 a	0.4 b	13.8 b
II	108 a	1.0 a	15.5 a
III	110 a	1.0 a	15.1 a
IV	104 b	1.3 a	15.2 a
LSD	2.6	0.4	0.6

Numbers followed by a different letter are significantly different at the 5% level according to Duncan's Multiple Range Test.

Management level differences occurred in plant height (Management IV significant less), lodging (Management I significant less) and protein (Management level I significantly less).

Disease pressure was severe due to wet weather conditions. Disease ratings of Septoria (ZGS 59) were very high ranging from 40-90% of the plot, which reduced management effectiveness.

SIGNIFICANT VARIETAL DIFFERENCES

Variety	Winter Survival	Test Wt. kg/hl	1000 K.Wt. (g/1000)	Protein (%)	Yield t/ha
Absolvent	90.4 a	71.8 b	27.8 b	15.6 b	2.3 b
Borden	94.4 a	80.0 c	27.4 bc	13.0 e	3.8 a
Decade	87.8 ab	54.2 f	19.9 e	13.9 d	2.6 b
Monopol	92.6 a	65.8 d	21.6 d	14.6 c	2.4 b
Perlo	42.8 c	64.6 d	22.9 d	16.6 a	1.0 d
Vuka	79.7 b	62.5 e	26.5 c	15.9 b	1.8 c
F29-76	90.9	77.2 a	31.8 a	14.9 c	4.0 a
LSD	8.2	1.5	1.3	0.4	0.3

Numbers followed by a different letter are significantly different at the 5% level according to Duncan's Multiple Range Test.

Varieties did give significant differences from one another in most parameters. Perlo (42.8%) and Vuka (79.2%) survival were significantly less than the other five varieties (all above 87% survival). In the two previous years Perlo had good winter survival (equal to or better than Monopol), however during the winter of 87/88 with no ground frost, early and persistent snow cover the Perlo winter killed extensively in Central and Northern Nova Scotia, but survived well in the Annapolis Valley. This reduced survival of Perlo may be attributed to snow mold. Borden (3.8 t/ha) and F29-76 (4.0 t/ha) out yielded the other varieties with Perlo the lowest and Vuka next, due mainly to winter survival.

The excessively heavy disease pressure which was not adequately controlled in any treatments resulted in very low yields, test wt., 1000 kernel weights and contributed to high grain protein content.

Perlo and F29-76 are not presently registered to be grown in Eastern Canada but may be considered for registration for the 1989 planting season.

SPRING CEREAL RATE OF SEEDING TRIAL

Dwane Mellish
Assistant Director

This was the third year of a three year study investigating the response of spring cereals to a range of seeding rates. All varieties received the recommended foliar disease and lodging control for that particular cultivar. The three year combined results follows the 1988 results.

Location:	Great Village	**Co-operator:**	R. Cooper
Preceding Crop:	Carrots	**Soil Type:**	Sandy Loam
Seeding Date:	April 18	**Experimental Design:**	RCBD
Seeding Rates:	(seeds/m^2)	**Plot Size:**	6m x 1.25m
	100, 200, 300, 400, 500, 600		
Varieties:	Rodeo, Leger, Max, Beaguelita, Tibor		
Harvest Date:	Rodeo, Leger - Aug. 9		
	Max, Beaguelita, Tibor - Aug. 24		
Fertilization:	Planting 400 kg/ha 17-17-17		
	ZGS 30 150 kg/ha 34-0-0		
Herbicide:	1.5 L/ha Target June 4		

Variety	Fungicide	P.G.R.
2-Row Barley (Rodeo)	125 gai/ha Tilt ZGS 30 & 45	
6-Row Barley (Leger)	125 gai/ha Tilt ZGS 30 & 45	360 gai/ha Cerone ZGS 45
Spring Wheat (Max)	125 gai/ha Tilt (ZGS 30 & 45) 500 gai/ha Bravo	360 gai/ha Cerone ZGS 45
Oats (Tibor)	125 gai/ha Tilt ZGS 30 & 45	
Triticale (Beaguelita)	125 gai/ha Tilt 500 gai/ha Bravo 500	

ANOVA TABLE FOR PARAMETERS MEASURED

	Rodeo	Leger	Max	Beaguelita	Tibor
Plants/m^2	**	**	**	**	**
Plant Ht.	**	N.S.	N.S.	N.S.	N.S.
Heads/m^2	N.S.	N.S.	N.S.	N.S.	**
Head Disease	N.S.	N.S.	N.S.	N.S.	N.S.
Kernel Wt.	**	N.S.	N.S.	*	*
Test Wt.	*	N.S.	*	N.S.	N.S.
Yield	**	N.S.	N.S.	**	**
Leaf Disease	N.S.	N.S.	N.S.	N.S.	N.S.

Plants/m2

Seeding Rate (Kernels/m^2)	Rodeo	Leger	Max	Beaguelita	Tibor
100	90 e	84 e	96 e	51 e	47 c
200	187 d	152 d	154 d	128 d	88 bc
300	242 c	200 c	201 c	157 cd	152 ab
400	306 b	246 b	260 b	206 bc	150 ab
500	307 b	315 a	335 a	238 b	185 a
600	362 a	332 a	362 a	308 a	209 a
LSD	44	35	33	57	66.6

Heads/m^2

100	552	371	410	257	218 c
200	736	347	423	268	265 bc
300	590	292	428	338	271 bc
400	752	348	485	340	290 b
500	772	347	465	371	299 b
600	746	444	424	371	363 a
LSD	N.S.	N.S.	N.S.	N.S.	54.1

Yield

100	4.2 c	3.3	3.4	2.9 c	1.3 d
200	4.7 b	3.7	3.8	3.4 b	1.7 c
300	5.3 a	4.3	3.9	3.9 ab	2.1 b
400	5.0 b	3.8	3.5	3.9 a	2.3 ab
500	5.0 b	3.9	3.8	3.9 a	2.4 ab
600	4.7 b	3.7	3.8	4.2 a	2.4 a
LSD	.3	N.S.	N.S.	.4	.3

Numbers followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

All varieties reached maximum plant establishment at the highest seed rates, 600 seeds/m^2, however field germination of both Tibor hulless oats and the Beaguelita triticale was very low.

Tibor was the only variety with a significant difference in heads/m^2, the 600 seeds/m^2 rate giving the maximum count.

Leger and Max gave no significant difference in yield. Rodeo reached maximum yield at the 300 seed/m^2 rate; Beaguelita between the range of 200-600 seeds/m^2; and Tibor at the rate of 400-600 seeds/m^2.

Disease pressure was high, however, no differences due to seeding rates were seen. There was no lodging in the Max and Beaguelita, while Leger, Rodeo and Tibor had severe lodging.

RATE OF SEEDING COMBINED
1986-88

	Plants /m^2	Plant Height	Heads /m^2	1000 K.Wt.	Test Wt.	Yield
Leger						
Year	**	*	*	*	**	**
Rate	**	**	**	**	**	**
Year x Rate	*	N.S.	N.S.	**	N.S.	N.S.
Beaguelita						
Year	**	*	N.S.	**	**	*
Rate	**	N.S.	**	**	**	**
Year x Rate	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Max						
Year	**	*	**	**	**	N.S.
Rate	**	N.S.	**	*	**	**
Year x Rate	*	N.S.	N.S.	N.S.	N.S.	**
Rodeo						
Year	**	N.S.	**	**	**	**
Rate	**	**	**	**	N.S.	**
Year x Rate	**	N.S.	N.S.	N.S.	**	**

Seeding Rate (Seeds/m^2)	Leger	Beaguelita	Rodeo (Interaction)	Max (Interaction)
100	4.1 b	3.8 c	4.1	3.2
200	4.6 ab	4.6 b	4.5	3.8
300	5.0 a	5.0 ab	4.9	3.9
400	4.6 ab	5.3 a	4.9	4.0
500	5.0 a	5.5 a	5.0	4.1
600	5.0 a	5.3 a	5.0	4.1
LSD	.6	.4		

Numbers followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

	Seeding Rate (seeds/m^2)	Rodeo	Max
87	100	3.9	3.3
	200	3.7	4.3
	300	4.2	4.2
	400	4.2	4.7
	500	4.5	4.6
	600	4.9	4.5
86	100	4.3	2.9
	200	5.0	3.3
	300	5.1	3.6
	400	5.4	3.8
	500	5.4	3.9
	600	5.5	4.0
88	100	4.2	3.4
	200	4.7	3.7
	300	5.3	3.9
	400	5.0	3.5
	500	5.0	3.8
	600	4.7	3.8

As expected in most parameters significant differences are seen, except in Max, yield, Beaguelita, heads/m^2, and Rodeo plant height giving an indication that the three growing seasons were different (also location).

Rate effects over the 3 years also resulted in significant differences, excluding Beaguelita plant height, Max plant height and Rodeo test wt. The 3 year combined results increased the significance of rate effects, especially when looking at the 1988 results. Leger and Max in 1988 gave no significance but combined they did.

The 1988 effect is due to abnormal high lodging and disease pressures, due to periods of excessively high rainfall, which was not adequately controlled by the management practices used.

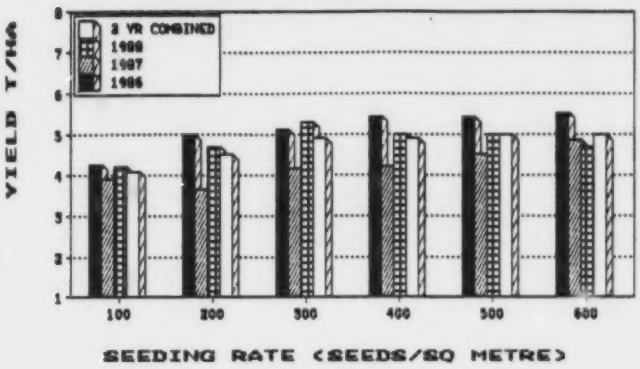
The significance of interactions, Max and Rodeo yield for example, indicate that year and rate effects were not the same over the 3 years. Beaguelita had no interaction significance.

This trial would indicate that the Leger (6-row barley) and the Beaguelita (triticale) do not show a yield response beyond a seeding rate of 300 seeds/m^2 whereas the Rodeo (2-row barley) and the Max (spring wheat) shows a yield response to at least a 400 seeds/m^2 seeding rate. These results were obtained over three years of very different growing conditions. The crop was grown in 15 cm rows and may not indicate the true response in narrower row spacing (10 cm or less).

This trial does indicate the tremendous ability of these crops to produce yield at low seeding rates when proper fertility is applied and disease and lodging control is provided for.

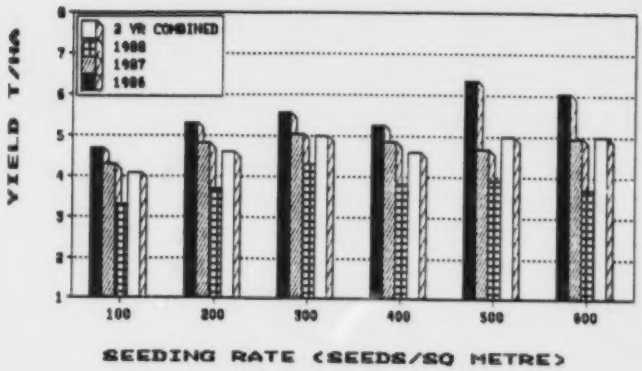
RODEO RATE OF SEEDING

1986,1987,1988,3 YEAR COMBINED



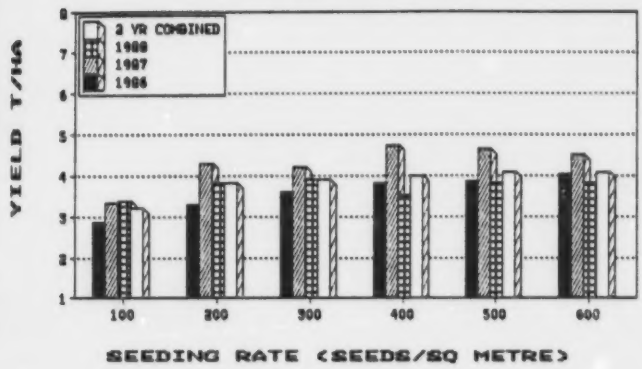
LEGER RATE OF SEEDING

1986,1987,1988, 3 YEAR COMBINED



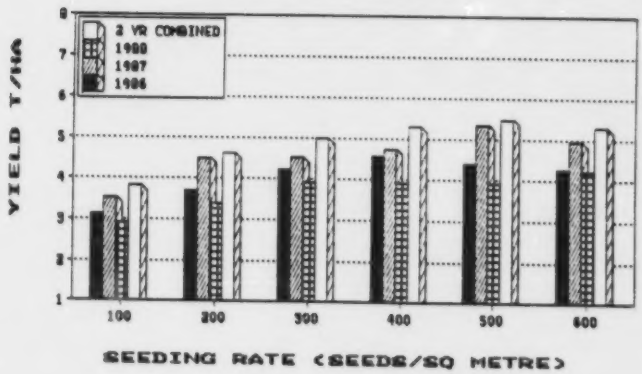
MAX RATE OF SEEDING

1986,1987,1988,3 YEAR COMBINED



BEAGUELITA RATE OF SEEDING

1986,1987,1988,3 YEAR COMBINED



BARLEY PRODUCTION MANAGEMENT TRIALS

Dwane Mellish,
Assistant Director

This trial is one of an ongoing series of trials (at five locations) to assess the response of 2-row and 6-row barley varieties to four levels of management.

Location:	Great Village	**Co-operator:**	Robert Cooper
Preceding Crop:	Carrots	**Soil Type:**	Sandy Loam
Seeding Date:	April 18	**Experimental Design:**	Split Plot
Seeding Rate:	400 seeds/m^2	**Harvest Date:**	2-row - August 9 6-row - August 10
Plot Size:	1.25 m x 6m		
Herbicide:	1.5 L/ha Target		
Fertilization:	All treatments received 400 kg/ha 17-17-17 priot to planting.		
Varieties:	2-row: AB79-17, AB93-2, AB94-11, Albany, Helena, QB751-12, Rodeo. 6-row: Cadette, Duke, Leger, Chapais, QB532-13, Samson, TBP854-35.		

Management Levels:

I)	Standard	No additional treatments
II)	Additional N	Management I plus 150 kg/ha 34-0-0
III)	Additional N + Fungicide	Management II plus Tilt 125 gai/ha @ ZGS 37 & ZGS 45
IV)	Additional N + Fungicide	Management III plus Cerone 300 gai/ha @ ZGS 39/45

2-ROW BARLEY: ANOVA TABLE

	Plants /m^2	Heads /m^2	Plant Height (cm)	Heading Date	Lodging Harvest	Yield
Management	N.S.	**	**	**	**	**
Variety	*	**	**	**	**	**
Variety x Management	N.S.	N.S.	N.S.	**	*	**

	1000 K.Wt.	Test Wt. (kg/hl)	Net Blotch	Protein
Management	**	**	**	**
Variety	**	**	**	**
Variety x Management	**	**	**	N.S.

2-ROW BARLEY

Results

The benefit of early planting was reduced due to cold damp weather which followed early in the growing season. Disease pressure and lodging were severe due to wet conditions during heading and grain fill.

Grain Yield

	I Stan	II Add N	III Add N + F	IV Add N + F + PGR
AB79-17	4.8	5.2	5.2	5.7
AB93-12	4.9	5.1	5.3	5.8
AB94-11	4.4	4.4	5.1	5.9
Albany	4.3	4.5	5.3	5.9
Helena	4.6	4.4	4.9	5.5
QB951-12	4.3	4.0	5.2	6.2
Rodeo	4.2	4.1	5.7	5.3

Lodging (0.2 - 9.0)

	I Stan	II Stan + N	III Add N + Fung	IV Add N + F + PGR
AB79-17	1.9	6.3	5.9	3.4
AB93-12	4.8	6.4	6.8	4.2
AB94-11	3.0	6.6	6.6	4.9
Albany	3.5	6.6	6.9	3.4
Helena	2.8	5.3	4.9	1.9
QB751-12	3.2	7.0	5.5	3.9
Rodeo	3.4	6.4	6.2	3.9

Additional N

Yields for Helena, QB751-12 and Rodeo were below the Standard Management; AB94-11 remained the same, while AB79-17, AB93-12 and Albany were slightly increased. All varieties showed a decrease in 1000 k.wt. ranging from .3 - 3.6 grams. Lodging ratings were, on the average, double that of the Standard Management.

Additional N + Fungicide

The addition of fungicide increased yields of six varieties from .2 t/ha to as much as 1.2 t/ha (QB751-12) and 1.6 t/ha (Rodeo). 1000 k.wts. were all increased over Management II with Albany, QB751-12 and Rodeo averaging a 10 gram increase. Lodging as in Management II was severe.

Additional N + Fungicide + PGR

Lodging was reduced by a third to a half over the varieties and 1000 k.wt. remained within 2.0 grams of management III. Yields therefore were increased for all varieties except P.G.R. sensitive Rodeo (decreased .4 t/ha) with QB751-12 increasing from 5.2 to 6.2 /ha.

Overall QB751-12 showed the best response to fungicide and P.G.R. management and yielded the highest.

Management Level II produced significantly the highest protein levels (1.23%), levels III & IV (11.4%) and the Standard Level (10.5%) significantly the lowest protein.

6-ROW BARLEY: ANOVA TABLE

	Population /m^2	Heads /m^2	Plant Height	Head Date	Lodging	Yield
Management	N.S.	**	**	**	**	**
Variety	**	**	**	**	**	**
Management x Variety	N.S.	N.S.	**	**	**	N.S.

	1000 K.Wt.	Test Wt.	Net Blotch	Scald	Protein
Management	**	**	N.S.	N.S.	**
Variety	**	**	**	N.S.	**
Management x Variety	*	**	N.S.	N.S.	N.S.

6-ROW BARLEY PRODUCTION MANAGEMENT

Grain Yield (t/ha)

	1	2	3	4
Cadette	4.7	4.7	5.7	4.3
Duke	4.8	5.2	5.5	5.0
Leger	5.0	5.1	5.6	5.2
Chapais	5.1	5.8	5.5	5.3
QB582.13	4.8	5.1	6.1	5.9
Samson	4.8	4.9	5.3	4.7
TBP854-35	4.4	4.6	5.0	4.8
Mean	4.8 b	5.0 b	5.5 a	5.0 b

Lodging (0.9 - 9.0)

	1	2	3	4
Cadette	0.2	1.0	1.1	0.2
Duke	0.2	0.2	0.2	0.2
Leger	1.2	4.4	4.5	1.4
Chapais	0.6	2.4	3.7	0.2
QB582.13	2.2	4.8	4.8	0.5
Samson	0.4	2.2	4.2	0.2
TBP854-35	1.2	4.1	5.7	0.2

6-ROW BARLEY

Additional N

Except for Cadette, which remained the same, five varieties increased yields marginally with QB198-27 having the largest increase of 0.7 t/ha. No lodging occurred with Duke, limited with Cadette but was significantly greater in the other varieties. 1000 k.wts. were slightly reduced with the exception of Leger.

Fungicide

With the exception of QB198-27, yields were increased by as much as 1.0 t/ha (QB582-13 and Cadette). Lodging maintained the same levels as management II. 1000 k. wts. were 3.9 grams, increased by as much as 5.3 grams. QB582.13 and Samson 4.1 grams. Cadette and marginally with Duke, Leger, TBP854-35, while reducing QB198-27 slightly.

P.G.R.

The application of P.G.R. reduced Cadette yield the most by 1.4 t/ha, while others were reduced by as much as 0.5 t/ha. Lodging was reduced in all varieties except Duke which had none throughout the trial.

1000 k.wts. were increased with Cadette, Duke Leger, TBP854-35, remained the same with Samson and reduced QB582.13.

General

Protein levels were lowest with the Standard Management (9.5%), slightly higher with treatments II & III (10.7%) and slightly higher again with treatment IV (11.1%).

Samson and Duke are semi dwarf barley varieties from Western Canada, while Cadette is a semi dwarf bred in Quebec. These semi dwarfs have a strong resistance to lodging and in most cases do not benefit from the use of a P.G.R. Yield is actually reduced in some cases. Cadette did not yield well until a fungicide was applied due to its high susceptability to disease but yielded well under the fungicide program.

Chapais (QB198-22) is a newly registered variety from the Quebec breeding program and performed well in this trial, exhibiting good straw strength and yielding well at all management levels.

Cost of production figures were used to calculate the cost/tonne of grain produced under the four management systems. Variable costs were calculated to be $336/hectare including costs for production, harvesting and cost over head based on Farm Management Fact Sheet 1986-104. It is assumed barley was grown on a farm with more than the barley enterprise sharing the fixed cost. A fixed cost of $138 is used. A straw credit of $50/ha is deducted from the total cost. The base cost of production therefore is (336 + 138 - 50) $424/ha.

2-ROW BARLEY COST OF PRODUCTION

	Standard ($424/ha)		Add N ($471/ha)		Add N + F ($516/ha)		Add N + F + PGR ($544/ha)	
Variety	Yield	$/t	Yield	$/t	Yield	$/t	Yield	$/t
AB79-17	4.8	88	5.2	96	5.2	99	5.7	95
AB93-12	4.9	87	5.1	92	5.3	97	5.8	94
AB94-11	4.4	96	4.4	107	5.1	101	5.9	92
Albany	4.3	99	4.5	107	5.3	97	5.9	92
Helena	4.6	92	4.4	107	4.9	105	5.5	99
QB751-12	4.3	99	4.0	118	5.2	99	6.2	88
Rodeo	4.2	101	4.1	115	5.7	91	5.3	103

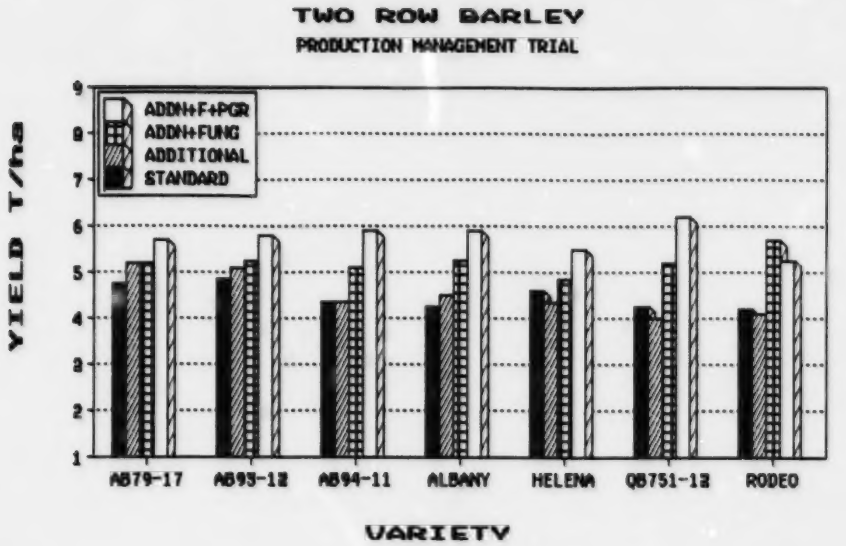
6-ROW BARLEY COST OF PRODUCTION

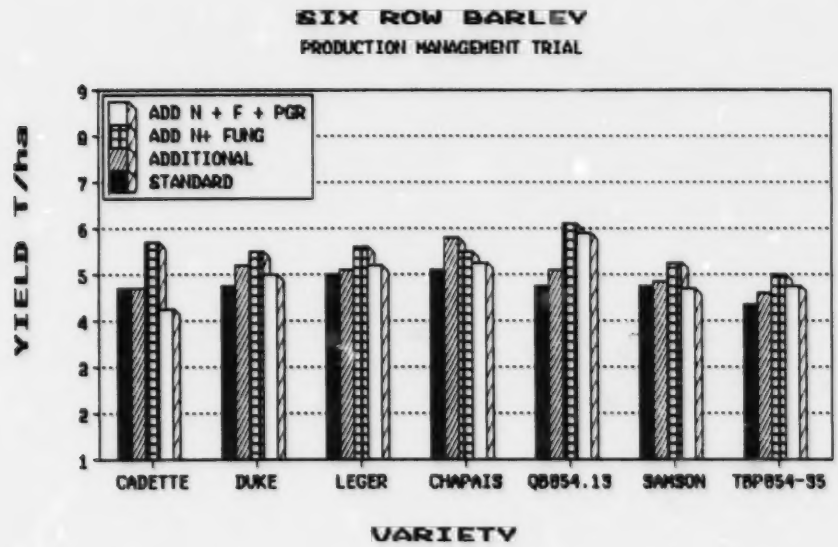
Cadette	4.7	90	4.7	100	5.7	91	4.3	127
Duke	4.8	88	5.2	91	5.5	94	5.0	109
Leger	5.0	85	5.1	92	5.6	92	5.2	105
Chapais	5.1	83	5.8	81	5.5	94	5.3	103
QB582.13	4.8	88	5.1	92	6.1	85	5.9	92
Samson	4.8	88	4.9	96	5.3	97	4.7	116
TBP854-35	4.4	96	4.6	102	5.0	103	4.8	113

Overall the additional N management level increased the cost per tonne for both six and two row varieties. In the 2-row barleys, the addition of fungicide reduced the cost of production in 5 of 7 varieties, while the use of P.G.R. reduced cost/tonne below the cost of additional N in all varieties.

The 6-row barley reacted differently with some varieties reducing cost from the additional N treatment, increasing for others and remaining the same for another when fungicide was added. The cost of P.G.R. increased all varieties cost/tonne.

The choice of variety, weather conditions and varietal response to the management inputs can be demonstrated in this comparison.


TWO ROW BARLEY
PRODUCTION MANAGEMENT TRIAL
ADDN+F+PGR
ADDN+FUNG
ADDITIONAL
STANDARD
YIELD T/ha
9
8
7
6
5
4
3
2
1
AB79-17
AB93-12
AB94-11
ALBANY
HELENA
QB751-12
RODEO
VARIETY


SIX ROW BARLEY
PRODUCTION MANAGEMENT TRIAL
ADD N + F + PGR
ADD N+ FUNG
ADDITIONAL
STANDARD
YIELD T/ha
9
8
7
6
5
4
3
2
1
CADETTE
DUKE
LEGER
CHAPAIS
QB854.13
SAMSON
TBP854-35
VARIETY

DISEASE CONTROL ON SPRING WHEAT

Dwane Mellish,
Assistant Director

This is the second year of a trial conducted to identify foliar fungicide combinations to control Septoria on the spring wheat variety Max.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy loam
Seeding Date:	May 6th	**Harvest Date:**	August
Seeding Rate:	450 seeds/m^2	**Experimental Design:**	RCBD
Plot Size:	12m x 6m		
Fertilization:	Planting 400 kg/ha 17-17-17		
	ZGS 30 150 kg/ha 34-0-0		
	ZGS 45 150 kg/ha 34-0-0		
Herbicide:	1.5 l/ha Target		

ANOVA TABLE FOR PARAMETERS MEASURED

	Septoria 3rd leaf	1000 k.wt.	Test wt.	Yield
Fungicide Treatment	**	**	**	**

TREATMENT	RATE (g a.i./ha)	APPLICATION (ZGS)	SEPTORIA (3rd Leaf) % (ZGS 65)	TKW (g/1000)	YIELD (t/ha)
Check	-	-	3.2 abc	21.3 f	2.3 h
Tilt	125	31	3.3 ab	22.3 f	2.3 h
Tilt	125	39	2.4 bcdefgh	22.3 f	2.5 gh
Tilt	125	57	2.5 bcdefg	25.2 de	2.8 fg
Tilt/Bravo	125/1000	31	2.8 abcdef	22.2 f	2.5 gh
Tilt/Bravo	125/1000	39	1.5 fghi	25.3 de	3.1 def
Tilt/Bravo	125/1000	57	2.7 abcdef	26.6 cd	3.1 def
Tilt/Dithane	125/1760	31	2.3 bcdefghi	21.6 f	2.4 h
Tilt/Dithane	125/1760	37	1.2 hi	23.0 ef	3.0 ef
Tilt/Dithane	125/1760	57	2.0 cdefghi	26.3 d	3.2 cde
Tilt	125	31 + 57	1.9 defghi	25.5 de	3.2 cde
Tilt + Tilt/ Bravo	125 + 125/ 1000	31 + 57	2.9 abcde	28.9 bc	3.5 cd
Tilt + Tilt/ Dithane	1760	31 + 57	2.6 bcdef	25.4 de	3.1 def
Tilt	125	39 + 57	1.1 i	28.8 bc	3.4 cd
Tilt/Bravo	125 + 1000	39 + 57	1.6 fghi	31.5 a	4.2 a
Tilt/Dithane	125 + 1000	39 + 57	1.3 ghi	29.4 ab	3.8 b
Bravo	1000	39 + 57	2.0 cdefghi	25.3 de	2.8 fg
Dithane	1760	39 + 57	1.7 efghi	24.8 de	2.9 ef
Folicure	125	31	3.4 ab	21.3 f	2.4 gh
Folicure	125	39	2.0 cdefghi	21.8 f	3.4 h
Folicure	125	57	3.9 a	24.9 de	2.8 fg
Tilt + Tilt/ Bravo/Benelate	125 + 125/ 1000/250	31 + 57	3.0 abcd	28.9 bc	3.6 bc
LSD (0.05)			0.4	0.8	0.1

Persistant wet weather conditions from mid July to harvest resulted in very high disease pressure during the grain filling period. The combination of a systemic and protectant fungicide applied at ZGS 39 and again at ZGS 57 gave the highest kernel weights and the highest grain yields. The protectants alone were incapable of controlling the heavy disease pressure but they contributed significantly when combined with the systemic fungicide. No single application timing gave adequate control under the high disease pressure present.

SPRING WHEAT RATE OF SEEDING & ROW SPACING

Dwane Mellish,
Assistant Director

As part of an ALFI Technology Transfer Project, the second year of a row spacing and seeding rate trial was completed. The trial was conducted with the co-operation of Bob Cooper, Great Village using an Amazone D830E 3 metre wide grain drill. The trial was seeded using 8 cm and 16 cm row spacing with a seeding rate of 300 and 450 seeds/m^2 (adjusted for kernel wt.).

The plots were seeded 3m wide and 10m long with treatments randomized within each of four replicates. After seeding field scale equipment was used to apply uniform fertility, weed control and disease control. Yields were taken by harvesting a 1.25m x 10m long strip from the middle of each plot using a Hege plot combine.

The four treatments were as follows:

Treatment	Row Spacing	Seeds/m^2	kg/ha
I	16 cm	300	110
II	16 cm	450	170
III	8 cm	300	110
IV	8 cm	450	170

Results

ANOVA TABLE

	Plants/m^2	Heads/m^2	Lodging	Yield
Row Spacing	NS	**	NS	NS
Seeding Rate	**	NS	NS	NS
Spacing X Rate	NS	NS	NS	NS

FIELD RESULTS

Treatment	Plants/m^2	Heads/m^2	Lodging (0.2-9.0)	Yield (t/ha)	%
I (16/300)	290	405	6.5	4.56	100
II (16/450)	401	425	7.1	4.81	106
III (8/300)	239	504	8.1	4.97	109
IV (8/450)	355	561	6.2	4.92	108

Increased seeding rate within a row spacing increased the number of plants/m^2 established but not the number of heads/m^2. The narrower row spacing gave a significantly higher number of heads/m^2 in both seeding rates even though it had not significantly influenced the number of plants/m^2.

The highest grain yield was produced with the narrow row spacings. If the potential return from grain produced is considered ($230/tonne milling wheat) as well as the additional cost of seed to bring the seeding rate from 300 to 450 seeds/m^2 (~$40/ha) the following comparison can be made.

Treatment	Yield (t/ha)	Gross	Extra Seed Cost	Net Increase (%)	Net Increase $/ha
I 16 cm/300	4.56	$1049	-	-	-
II 16 cm/450	4.81	$1106	+ $40	6	17
III 8 cm/300	4.97	$1143	-	9	94
IV 8 cm/450	4.92	$1132	+ $40	8	43

The highest yields were from the two narrow row spacing treatments, however when the cost of the additional seed for the high seeding rate was considered the 8 cm - 300 seeds/m^2 gave the best return compared to the conventional 16 cm/300 seeds/m^2 planting.

If this $94/ha advantage was applied to a farm with 50 ha of milling spring wheat, it would mean an additional return of $4,700/year. Based on this type of return an investment in new seeding equipment with narrow row spacing may be justified.

In 1987, a dry season there was no significant difference in yield but this years results certainly indicate an advantage to the narrower row spacing. This trial will be continued next year and expanded to include spring barley.

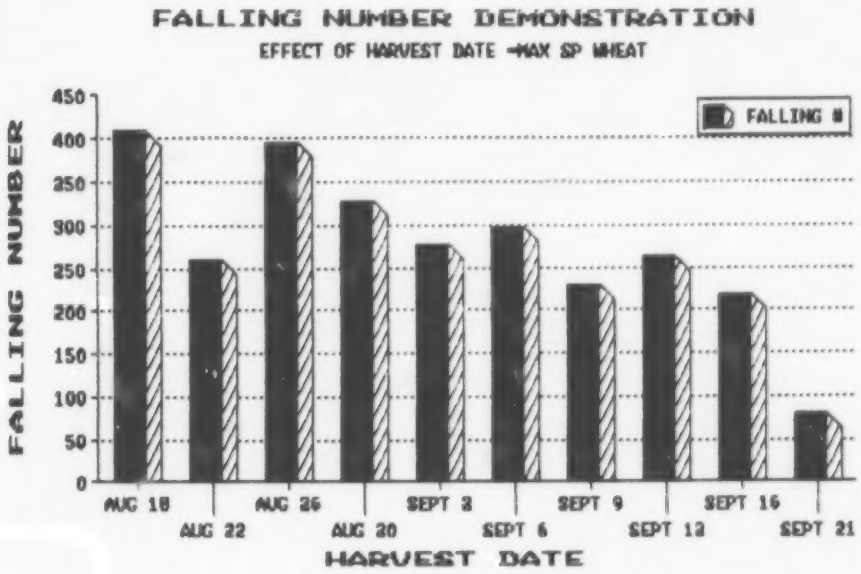
SPRING WHEAT QUALITY AND HARVEST TIME

Dwane Mellish,
Assistant Director

Recently it has been suspected that delay in harvest of wheat beyond a reasonable grain moisture level may lead to the deterioration of grain quality due to a drop in falling number which is an indication of head sprouting.

In order to get a preliminary look at this possibility in this region a field of Max spring wheat was sampled every three days from the time the grain moisture reached 30% to well beyond optimum harvesting date. Square metre, non replicated samples were harvested and grain moisture determined by an oven method. The samples were air dryed and had falling number as well as other grade factors assessed at the Steam Mill Grain Center.

The results of the information gathered is presented below in graph form. It should be noted that the present minimum acceptable falling number is 250.



Due to the very wet conditions the wheat dried down slowly, however, falling number stayed within the acceptable range until Sept. 6th, which was only a few days after it reached an acceptable harvest moisture. Following this date with the continuing wet weather falling numbers continued to drop and sprouting was detected in the Sept. 13th and all following samples.

This was a very preliminary study, however, it does support the accepted guidelines that wheat should be harvested as soon as possible, even if extra drying charges are incurred to assure the best quality product. If the crop is exposed to periods of damp or rainy weather after the grain moisture has fallen below 18-19% m.c. deterioration in falling number would be expected. This study will be conducted in more detail next year to provide a a more sound information base.

SPRING WHEAT PRODUCTION MANAGEMENT

Dwane Mellish,
Assistant Director

This is an ongoing, five location, series of trials to assess the response of spring wheat and spring triticale to four levels of management.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy Loam
Seeding Date:	May 6	**Harvest Date:**	Aug. 24
Seed Rate:	400 seeds/m^2	**Experimental Design:**	Split plot

Herbicide: 1.5 l/ha Target, 2.0 l/ha Mecoprop
Varieties: Max, Katepawa, Beaguelita, Belvedere
Management Levels:

I Standard - 400 kg/ha 17-17-17 seeding

II Additional N - Management I plus 150 kg/ha (50 kg/ha N 34-0-0) @ ZGS 30
Management I plus 150 kg/ha (50 kg/ha N 34-0-0) @ ZGS 45

III Add N + Fungicide - Management II plus Tilt 125 gai/ha /Bravo 1 kg gai/ha @ ZGS 39 & ZGS 55

IV Add N + Fung. + P.G.R. - Cerone 360 gms. gai/ha @ ZGS 45

ANOVA Table for Measured Parameters

	Pop. /m^2	Mildew % Plot ZGS 61	Septoria % Plot ZGS 61	Head /m^2	Plant Height	Head Date	Septoria Head ZGS 80
Management	N.S.	N.S.	**	N.S.	N.S.	**	**
Variety	**	**	**	**	N.S.	**	**
Mgt.x Var.	N.S.	N.S.	**	N.S.	N.S.	N.S.	N.S.

	Lodging Harvest	Yield t/ha	1000 K.Wt.	Test Wt. kg/hl	Protein
Management	**	**	**	**	**
Variety	**	**	**	**	**
Mgt.x Var.	**	**	**	**	N.S.

Yield t/ha

Variety	I	II	III	IV
Max	2.1	1.7	2.6	3.1
Katepawa	1.5	1.2	1.7	2.1
Beaguelita	2.1	1.9	2.2	2.3
Belvedere	2.4	2.1	3.3	3.4

Due to the very wet conditions yields were very low for all varieties and treatments.

With high moisture levels disease pressure was high with Beaguelita and Belvedere having less disease. Katepawa showed more symptoms of mildew than the Max. The fungicide reduced head Septoria by 50% but the head still had 25% of its area covered with Septoria.

Lodging pressure was also high and reduced in the P.G.R. treatments but each variety did not act similar as the interaction shows. The triticale had very little lodging over the 4 management levels.

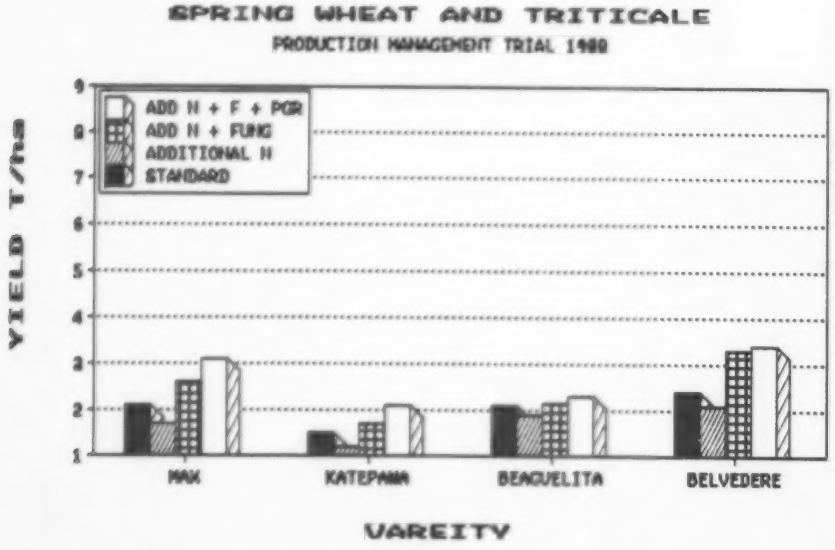
The interaction of management and variety was significant in lodging, yield, 1000 k.wt. and test wt., indicating all varieties did not act the same.

All variety yields were reduced with the additional nitrogen treatment. All varieties responded to the fungicide treatment increasing yield by as much as 0.9 t/ha with Max and 1.2 t/ha with Belvedere. The P.G.R. gave yield increases across all varieties with Max the most by 0.5 t/ha. Belvedere yielded the best overall with 3.4 t/ha.

Test wt. and 1000 k.wt. were decreased by additional N, increased by fungicide and further increased by the P.G.R.

Grain protein was very high (15.4-17.3%) as a reflection of very low kernel weights (23-29 g/1000).

Due to the adverse weather conditions and low yields this trial may not be representative of the potential for varieties and/or management treatments.



FOLIAR FUNGICIDES ON SPRING WHEAT & BARLEY

Dwane Mellish,
Assistant Director

San 619F is a new experimental compound being evaluated for foliar disease control in this region. In this trial San 619F at four rates of application was compared to Tilt as well as Bayleton and Folicure in the barley at one time of application (ZGS 45). The main interest was on the relative effectiveness of these compounds to control leaf disease on spring wheat and barley. This preliminary trial was conducted on Max spring wheat and Cadette barley.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy Loam
Seeding Date:	May 6	**Harvest Date:**	Aug. 24
Seeding Rate:	400 seeds/m^2	**Experimental Design:**	RCBD
Plot Size:	2 x 6m	**Harvest Plot Size:**	1.25 x 6m
Herbicide:	1.5 l/ha Target + 2.0 L/ha Mecoprop		
Fertilization:	400 kg/ha 17-17-17		
	150 kg/ha 34-0-0 @ ZGS 30		

Treatments	**Rate g a.i./ha**
SAN 619F	40
SAN 619F	60
SAN 619F	80
SAN 619F	100
Tilt	125
Check (Water)	

- application - July 13th ZGS 45

ANOVA Table for Measured Parameters

	Mildew % Flag ZGS 65	Septoria % Flag Leaf ZGS 65	Septoria % 3rd Leaf ZGS 65	Lodging Harvest
Treatment	**	**	N.S.	N.S.

	Yield	1000 K.Wt.	Test Wt. (kg/hl)
Treatment	**	**	*

Means for Significant Parameters

Treatment	Mildew % Flag ZGS 65	Septoria % Flag Leaf ZGS 65	Yield t/ha	1000 k.wt. (gms)	Test Wt. (kg/hl)
SAN 619F 40 g/ha	0.1 b	0.58 b	3.0 a	24.4 a	72.6 a
SAN 619F 60 g/ha	0.0 b	0.53 b	3.0 a	24.3 a	72.3 a
SAN 619F 80 g/ha	0.1 b	0.43 b	3.2 a	25.8 a	74.2 a
SAN 619F 100 g/ha	0.0 b	0.23 b	3.2 a	25.7 a	74.2 a
Tilt 125 g/ha	0.1 b	0.73 b	3.1 a	24.3 a	72.9 a
H_20 g/ha	0.7 a	1.68 a	2.4 b	20.6 b	69.8 b
LSD	0.3	0.6	.4	1.9	2.6

Numbers followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

All five fungicide treatments were statistically equal and significantly better than the check in the parameters Mildew (% flag leaf ZGS 65), Septoria (% flag leaf ZGS 65), yield, 1000 k.wt and test wt. The SAN 619F concentrations of 80 and 100 g/ha produced the highest yield, 1000 k.wt. and test wt., however, these were not significantly better than the other fungicide treatments.

SAN 619F has potential for both mildew control and Septoria control on spring wheat and should be further evaluated in a multi-timing of application trial to give a more complete assessment of its true potential.

CADETTE BARLEY

Location:	Boulden Field, NSAC	**Co-operator:**	Plant Science
Preceding Crop:	alfalfa/grass	**Soil Type:**	Sandy Loam
Seeding Date:	May 25, 1988	**Harvest Date:**	Aug. 24
Seeding Rate:	400 seeds/m^2	**Experimental Design:**	RCBD
Plot Size:	2 x 6m	**Harvest Plot Size:**	1.25 x 6m
Fertilization:	300 kg/ha 17-17-17 @ seeding 150 kg/ha 34-0-0 @ ZGS 30		

Treatments	Rates g/ha
SAN 619F	40
SAN 619F	60
SAN 619F	80
SAN 619F	100
Tilt	125 gai/ha
Bayleton	125 gai/ha
Folicure	125 gai/ha
Check	

TRIAL MEANS

	Blotch % flag ZGS 57	Blotch % 3rd flag ZGS 57	Yield t/ha	1000 k.wt.	Test Wt.
SAN 619F	1.0	1.5	4.6	36.1	53.1
SAN 619F	2.0	2.7	4.8	38.0	54.4
SAN 619F	2.2	3.0	4.3	36.5	53.1
SAN 619F	1.8	2.0	4.3	35.4	53.4
Tilt	2.1	2.6	4.1	36.4	53.4
Bayleton	1.2	1.9	4.5	37.2	52.2
Folicure	2.4	2.6	4.5	35.7	51.9
Check	1.8	2.7	4.6	36.5	52.5
	N.S.	N.S.	N.S.	N.S.	N.S.

The barley trial was late seeded and disease pressure was relatively low. No significant differences due to treatment were identified in disease ratings, 1000 k.wt, test wt. or yield response. This trial will be repeated for an additional year to further evaluate the relative effectiveness of these compounds.

EVALUATION OF PLANT GROWTH REGULATORS ON SPRING WHEAT

Jack Bent, Co-operating Farmer
Jack van Roestel, Crops Extension Specialist

Location: Weston, Kings County, N.S.

Planting Date: May 12, 1988

Planting Rate: 190 kg/ha in 15 cm row width

Previous Crop: Absolvent winter wheat

Fertility: 10,000 gal/ha of hog manure incorporated prior to planting supplying 70-40-50 kg/ha of N-P-K.
100 kg/ha of 34-0-0 at G.S.12
150 kg/ha of 34-0-0 at G.S.29
150 kg/ha of 34-0-0 at G.S.49

Herbicide: MCPA at 1.2 L/ha (G.S. 14)

Fungicides: Tilt at 0.5 L/ha (G.S.37)
Tilt (0.5 L/ha) and Diathane M 45 (2 kg/ha) at G.S.57

Plant Growth Regulations:

Trial Treatments

a) Cycocel at 0.3 L/ha (G.S. 30-31)
b) Terpal C at 1.0 L/ha (G.S. 37)
c) Cerone at 0.5 L/ha (G.S. 37-39)
d) Check strip, no P.G.R.

Harvest Date: August 24, 1988

Yields: The treatment weights were taken with axle-load scales from the total sample area of approximately 0.7 ha.. The wheat was 18% moisture at harvest and certified a Grade No. 3.

Overall yields on this field were extremely disappointing considering the inputs and fine management that went into this crop. The plant population, colour, and head size all indicated a 4 - 4.5 t/ha yield prior to flowering. However, as with 85 - 90% of the Max wheat grown in the Valley, the untreatable fusarium head disease severely decreased yields to the levels summarized below.

Treatment	Height (cm)*	Yield (kg/ha adjusted to 14%)
Cerone	90.6	3,179
Check	96.9	3,143
Terpal C	72.7	2,745
Cycocel	95.2	2,654

* There was about 2-3% lodging (insignificant) in all treatment except Terpal C.

MAX/KATEPWA MANAGEMENT COMPARISON

Dwane Mellish,
Assistant Director

To compare the response of two spring wheat varieties, Max and Katepwa, to fungicide and P.G.R. management. The trials were designed to look at each variety separately and combined. To date Max is the prominent spring wheat being grown in Nova Scotia for milling purposes, while Katepwa a western wheat has been used in other parts of the Region.

Location:	Great Village	**Co-operator:**	Tom & Mac Bowers
Preceding Crop:	Barley	**Soil Type:**	Sandy Loam
Seeding Date:	May 6	**Harvest Date:**	August 23
Seeding Rate:	400 seeds/m^2	**Experimental Design:**	Split Plot
Plot Size:	1.25m x 6m		
Herbicide:	1.5 L/ha Target + 2.0 L/ha Mecoprop		
Fertilization:	400 kg/ha 17-17-17 @ planting		
	150 kg/ha 34-0-0 @ ZGS 30		
	150 kg/ha 34-0-0 @ ZGS 45		

Treatments:

Fungicide	1) None	
	2) Tilt 125 gai/ha	
P.G.R.	1) CCC	0.3 L/ha product @ ZGS 30/31
	2) Cerone	0.5 L/ha product @ ZGS 39/45
	3) Terpal C	0.3 CCC x 0.5 L Cerone @ ZGS 37
	4) None	

Katepwa response to Fungicide/P.G.R.

The fungicide application significantly reduced Mildew (3rd leaf) ZGS 65, Septoria (3rd leaf) ZGS 65 and Septoria (% head). As well, the fungicide significantly increased yield, 1000 k.wt. and test wt.

Significant reduction of plant height was provided by all three P.G.R. treatments. Cerone significantly reduced lodging the most, Terpal next, ccc and the check significantly the least. All three P.G.R.'s significantly increased yield over the check, with Cerone and Terpal C increasing the test wt. significantly. There was no effect of P.G.R. on 1000 k.wt.

KATEPWA

ANOVA TABLE FOR MEASURED PARAMETERS

	Mildew % Flag ZGS 65	Mildew % 3rd leaf ZGS 65	Septoria % Flag ZGS 65	Plant Height (cm)	Septoria % Head
Fungicide	N.S.	**	N.S.	N.S.	**
P.G.R.	N.S.	N.S.	N.S.	**	N.S.
Fungicide x P.G.R.	N.S.	N.S.	N.S.	N.S.	N.S.

	Lodging Harvest	Yield	1000 K.Wt.	Test Wt. (kg/hl)
Fungicide	N.S.	**	**	**
P.G.R.	**	**	N.S.	**
Fungicide x P.G.R.	N.S.	N.S.	N.S.	N.S.

FUNGICIDE SIGNIFICANT PARAMETERS

	Mildew 3rd leaf ZGS 65	Septoria 3rd leaf ZGS 65	Septoria % Head	Yield t/ha	1000 K.Wt.	Test Wt. (kg/hl)
No. Fungicide	1.8 a	5.2 a	76.8 a	1.7 b	20.9 b	63.2 b
Fungicide	0.7 b	2.9 b	64.7 b	2.2 a	25.7 a	67.7 a
	0.5	1.7	8.7	.3	1.2	2.0

MAX RESPONSE TO FUNGICIDE/P.G.R.

Fungicide provided improved control of Mildew (flag leaf) ZGS 65, Septoria (3rd leaf) ZGS 65 and Septoria (% head). Fungicide application also significantly increased yield, 1000 k.wt. and test wt.

All three P.G.R. applications reduced plant height significantly from the check. Cerone reduced lodging significantly from the rest, Terpal C and check (no P.G.R.) next, ccc reduced lodging the least. Cerone and the check provided significantly the best yield, 1000 k.wt. and test wt.

	Mildew % Flag ZGS 65	Mildew % 3rd leaf ZGS 65	Septoria % Flag ZGS 65	Plant Height (cm)	Septoria % Head
Fungicide	*	N.S.	N.S.	N.S.	*
P.G.R.	N.S.	N.S.	N.S.	**	N.S.
Fungicide x P.G.R.	N.S.	N.S.	N.S.	N.S.	N.S.

	Lodging Harvest	Yield	1000 K.Wt.	Test Wt. (kg/hl)
Fungicide	N.S.	**	**	**
P.G.R.	**	**	**	**
Fungicide x P.G.R.	N.S.	N.S.	N.S.	N.S.

FUNGICIDE SIGNIFICANT PARAMETERS

	Mildew 3rd leaf ZGS 65	Septoria 3rd leaf ZGS 65	Septoria % Head	Yield t/ha	1000 K.Wt.	Test Wt. (kg/hl)
No. Fungicide	2.38 a	3.12 a	61 b	1.9 b	19.3 b	60.6 b
Fungicide	1.05 b	1.59 b	46 b	2.8 a	24.3 a	66.2 a
	1.2	.4	1.3	.1	1.4	2.2

The performance of the two varieties were compared.

ANOVA TABLE - MAX/KATEPWA COMBINED

	Mildew 3rd leaf ZGS 65	Septoria % Head	Lodging Harvest	Yield	1000 K.Wt.	Test Wt.
Variety	**	**	*	**	**	**
Fungicide	**	**	N.S.	**	**	**
Variety x Fungicide	**	N.S.	N.S.	**	N.S.	N.S.
P.G.R.	N.S.	N.S.	**	**	**	**
PGR x Fung.	N.S.	N.S.	*	N.S.	N.S.	N.S.
PGR x Variety	N.S.	N.S.	N.S.	**	**	**
PGR x Fung. x Variety	N.S.	N.S.	N.S.	*	N.S.	N.S.

Both varieties were subjected to very high disease pressures and even with foliar fungicides, disease control was not complete. Mildew, septoria and fusarium were all prominent. Yield levels in these plots were approximately 50% of the adjacent Max field indicating the impact of the disease pressure.

Variety	Fungicide	Yield	1000 k.wt.	Test Wt.
Katepwa	None	1.7	20.9	70.2
Katepwa	Fungicide	2.2	25.7	74.7
Max	None	1.9	19.3	67.2
Max	Fungicide	2.8	24.3	73.2

Both varieties did respond to the foliar fungicide with Max yielding more grain either with or without the fungicide program. In all cases 1000 k.wts. and yields are unacceptably low and thus this trial may not be a true indicator of the response of these varieties to these various inputs. This trial will be continued next year.

ON FARM BARLEY PRODUCTION MANAGEMENT TRIALS

Eric Bosveld, Soil and Crop Specialist
Bev Connell, Assistant Agricultural Representative

There were two participants in this year's barley production management demonstrations, both located in Cumberland County.

The objective of these trials to introduce co-operators to ICM barley production practices, and to give them guidance in respect to the timing and rates of fungicides and plant growth regulators. Furthermore, participants receive advice on seeding rates, fertilizer rates and/or timings, seedbed preparation, weed control, etc. to help improve their yields and ultimately their barley production profitability.

A trial at Bev Mason's consisted of four unreplicated treatments applied in adjacent strips.

1. Standard N (350 kg/ha 17-17-17 at seeding)
2. Additional N (Standard N + 150 kg/ha 34-0-0)
3. Add N + Cerone (Treatment # 2 + Cerone @ 0.75 l/ha)
4. Add N + Cerone + Tilt (Treatment # 3 + Tilt @ 0.5 l/ha)

The results are reported in the following table;

	Treatment 1	Treatment 2	Treatment 3	Treatment 4
% Crude Protein (as fed)	14.9	15.6	15.4	14.7
% Moisture	11.3	10.9	10.5	11.6
1000 Kernel Weight (gms.)	34	38	35	35
Test Weight (kg/HL)	56	53	54	54
Yield (kg/ha)	3462	3162	4710	4053
*Economic Impact ($/ha)	0	-97.70	+119.43	-23.19

*Economic impact is calculated by taking the difference in yield between the treatment and treatment # 1, multiplying by the price of barley and subtracting the cost of the treatment input. The following prices were used:

Barley - $160.00/t
Cerone - $33.75/ha
Tilt - $37.50/ha
A.N. (@150 kg/ha) - $46.50/ha

There was significant amounts of lodging at Bev's in 1988 and the best yields were obtained when Cerone was used. When Cerone and additional nitrogen were applied, Bev obtained 1.2 t/ha more barley than in the Standard nitrogen treatment. When the costs of nitrogen and Cerone are taken from the value of this extra barley, he still obtained an extra $119.43 worth of feed. The application of additional nitrogen without a fungicide or plant growth regulator reduced yield mainly because of the increased lodging that occurred.

The benefits of using plant growth regulators and fungicides are most pronounced when there are high potential yields. At the early growth stages when this field was observed, it was noted that the left side of the field had the highest potential yield. The soil had better tilth, there were less weeds, the seedlings appeared more vigorous and the population was better (uniform emergence i.e. less skips). This is the part of the field that was used as the Standard N treatment. In the areas where treatments 3 and 4 were applied (and especially treatment 4) the yield potential was substantially less due to these factors. Therefore, it is quite surprising that good results were obtained and although treatment 4 yielded almost 600 kg/ha more than the Standard N, it would have no doubt yielded substantially less had the treatments not been applied.

The trial at Stan Moore's consisted of three unreplicated strips of the following treatments:

1. Additional N (350 kg/ha 17-17-17 + 150 kg/ha 34-0-0)
2. Add N + Tilt (Treatment 1 + Tilt @ 0.5 l/ha)
3. Add N + Tilt + Cerone (Treatment 2 + Cerone @ 0.75 l/ha)

The results are reported in the following table:

	Additional N	Add N + Tilt	Add N + Tilt + Cerone
% Crude Protein (as fed)	13.8	13.3	13.1
% Moisture	11.3	12.3	12.8
1000 Kernel Wt. (gms.)	38	42	42
Test Weight (kg/hl)	45	51	51
Yield (kg/ha)	2845	4427	3715
Economic Impact ($/ha)	0	+215.62	+67.95

Approximately 20% of the area in Treatment 1 was lodged and the majority of this was due to stem breakage. The addition of Tilt improved the yield by a phenominal 1.5 t/ha indicating the disease pressure. The fungicide significantly improved the kernel weight and improved the crops ability to resist lodging since straw can be significantly weakened at the nodes by

disease. The density of the barley seed was also tremendously improved with the use of Tilt, as measured by the test weight. When the cost of Tilt is subtracted from the value of the extra barley produced by Treatment 2, an economic impact value of $215.62/ha is obtained. This means that Stan received an extra $215.62 worth of barley per hectare by simply applying a fungicide.

The kernel size and density was not affected by the use of Cerone, although the yield of Treatment 3 was substantially less than when Tilt was used alone (but still produced $67.95 worth of barley per hectare more than Treatment 1). Usually Cerone will only reduce yield when the crop is stressed when applied at the proper stage. If it is applied too late (or when any awns are showing) sterile heads can be the result. On the far side of the field there was a narrow strip in which there was no additional nitrogen applied and subsequently the crop stage was more advanced (the application of N delays maturity, i.e. keeps the plant vegetative longer to improve yield). In this area, there were a large number of heads that were sterile from the Cerone treatment, indicating it was sprayed when either the boots were starting to open or when the awns were visible. It is therefore suspected that the Cerone may have been sprayed a little too late, and although sterile heads were not obvious like on the far side of the field, it may have affected the yield somewhat. This demonstrates the importance of regular field checks and accurate assessments of crop stage.

Four co-operators had intended to participate in this years barley production management demonstrations, but were unable, for one reason or another, to apply the treatments when required. This demonstrates the need for co-operator commitment, since considerable effort was made by departmental personnel and companies in getting these trials underway. Furthermore, when companies donate products, it is fair to assume they will expect results to be obtained. Appreciation is extended to Ciba Geigy and May and Baker for their product donations and it is regretful that more support data is not available from these demonstrations.

These trials are easy to set up on your own farm and can really demonstrate the benefits of improved barley management. However, the best results are usually obtained when there is a high yield to protect (with antilodging agents and fungicides). Therefore the importance of early seeding, proper seedbed preparation, good weed control, high yielding varieties, etc. to obtain high economic yields cannot be over-emphasized.

1988 CANOLA PRODUCTION PROJECT

Jack van Roestel, Crops Extension Specialist

The largest planting of canola (118 ha) occurred in Nova Scotia this year, unfortunately the results show one of the lowest yields (1.3 t/ha avg.) in the crops six-year history here.

The '88 crop seemed to have trouble "getting out of the starting blocks" on many fields, with poor seedling vigour which perhaps can be attributed to a seed borne disease. Problems continued for some growers with weed and sclerotinia white mold disease. The majority of these problem fields did not have either a Treflan herbicide or Benlate fungicide treatment. However, its difficult to use these treatments as part of a full input/management package that runs $600-$700/ha., when the profit potential for the crop is usually considerably lower.

Table 1: Individual Farmers' Canola Production in 1988

Producer	Hectares	Tonnes	Moisture % (at delivery)
Paul Bartel	26	44.52	8.0 (home dried)
Willis Cock	7	13.26	20.7
J.D. & T. Fuller	5	8.70	27.9
Franklin Isaac	10	16.25	30.7
Lyndhurst Farms Ltd.	8	11.17	26.9
Meredith Farms Ltd.	8	5.78	22.9
John Merks & Son	10	12.92	25.6
G.A. & L.G. Palmer	14	13.22	24.9
Southview Farms	10	6.43	15.1
Frank Webb	10	10.14	26.5
Wilmar Acres Ltd.	10	10.21	19.8
	118	152.61	20.0

The future of canola production in Nova Scotia is still very clouded due to inconsistent world prices and the lack of local processing facilities or market. With one year left on the A.L.F.I., Canola Price Support Program, there will be production in '89 but after that it's hard to say what the future holds.

It's a shame that a local market niche for this crop has not yet surfaced in the Maritimes. Agronomically, canola is well suited to our climate and is an excellent rotation crop with small grain and corn, in terms of diminishing soil-borne diseases.

A group of individuals has been working to develop the local "cash" crop potential and usage of canola. Many of these people met in Truro in June '88 to discuss these matters.

Part of the discussions included a "round table" of experts asked to give direction in how to proceed with this crop. Included in this report are some of these recommendations, taken directly from the Proceedings of the Canola Utilization Workshop, Truro, June 1, 1988.

Recommendations from Round Table Discussion*

The seminar presentations highlighted the current use of canola as a crop, for livestock feeding and in the processing industry. Canola was shown to be readily grown in Nova Scotia. The use of canola as a crop appears to have good potential. The traditional uses of the crop in livestock feeds as a meal and in a limited way as whole seed illustrates the potential for the crop as an alternative to currently available protein and energy feeds. The recommendations made here attempt to address the needs for improved effectiveness of agronomic practices applied to the crop, to indicate future initiatives in processing to improve "the dollar added value" of the crop and to estimate the requirements for additional information on canola products in the animal feeding industry and food industry.

Agronomy

With respect to cultivar evaluation, continued support to test the genetic material is required to identify suitability for Nova Scotia conditions. Identification of high yielding canola cultivars is needed.

Management studies are needed to identify good control practices that will maintain the low disease conditions that exist presently.

Ways and means to ensure yield preservation need to be undertaken. Additional investigation is required to develop management strategy by the use of appropriate dessicants prior to combining. Harvest time moisture is of a concern. Mechanisms to give a rapid dry down should address this problem.

Exploration of cultivars with unique characteristics (example high palmitic acid canola) should be undertaken. Cultivars that show superior and unique products as well as good yield potential should be tested. Potentially these cultivars are well suited to our level of production on a small isolated land base. Additionally the use of unique cultivars with appropriate handling and processing could result in a premium return to the grower.

Processing

Traditional processing because of seed volumes and start-up costs are not feasible in Nova Scotia for the foreseeable future. Processing should be based on realistic provincial and regional production.

Short term utilization of the crop should be considered to use whole seed in pelleted rations for various livestock species. A pilot study should be undertaken to evaluate the effective use of whole seed in livestock rations. This is considered a short term solution since it does not increase the economic return to the grower.

Long term utilization of the crop should include investigation of uses of canola products from seed that will increase the value of the crop via production of specialty oil for human consumption with subsequent use of the meal for livestock feed.

Options for processing were presented:

a) a cold mechanical press system with production of high grade oil and an oil cake with high oil content.

b) a cold mechanical press system with subsequent aqueous enzyme produced from the enzyme extraction and a (low oil content) meal.
c) a supercritical carbon dioxide extraction plant that produces a low phosphorus oil and a meal that is similar to existing meals. The high quality of the oil should demand a premium.

As a priority a market study to investigate the economic potential for specific product from these options needs to be undertaken. The study should investigate the viability of the technologies suggested.

Utilization

With the short term use of whole seed investigation is needed to determine the effective use of nutrients in the seed when processed for animal consumption. Although the levels of use in ruminant rations are well established, the use of full fat canola in poultry feeds needs further investigation. The use of full fat canola in swine diets shows potential although there is need to know the effects on carcass quality not necessarily related to the return the producer would see as carcass index.

In light of the market study suggested, there will need to be investigation into the use of end products from the processes identified as showing high potential. This will probably involve pilot study level production of the end products of the process.

*Round Table Discussion

A total of 11 individuals were invited to form a round table discussion group to formulate recommendations from the workshop. These participants are identified as follows:

A.H. Fredeen	Dept. of Animal Science, N.S.A.C.
J.M. Bell	Dept. of Animal & Poultry Science, Univ. of Sask.
H.W. Hulan	Agriculture Canada, Kentville
R. Dechman	N.S. Grains Commission
D. Mellish	Soils & Crops, N.S. Dept. of Agric. & Marketing
C. Caldwell	Dept. of Plant Science, N.S.A.C.
G. Burris	N.S. Grains Commission
A. Gerritse	Port Williams Agencies, Port Williams
J. Mikle	P.O.S. Pilot Plant, Saskatoon
D.A. Christensen	Dept. of Animal & Poultry Science, Univ. of Sask.
D.M. Anderson	Dept. of Animal Science, N.S.A.C.

PIONEER HIGH MOISTURE EAR CORN HYBRID EVALUATION

Eric Bosveld,
Soil and Crop Specialist

Location:	Stewiacke	**Co-operators:**	John Vissers and Eli Harbers
Previous Crop:	Corn		
Planting Date:	May 20, 1988	**Co-ordinator:**	David Angevine Clarence's Farm Service
Planter Type:	Pneumatic Deutz Allis (model 285)		
Harvest Date:	October 10, 1988		
Fertility:	Heavy solid manure application (fall 1987) 120 kg/ha 46-0-0 broadcast and work in before planting 150 kg/ha DAP (18-46-0) in the planter		
Weed Control:	Dual T.M. (960 g/l)/Banvel T.M. (480 g/l) @ 2.5 l/ha and 1.25 l/ha respectively.		

Company	Hybrid	% D.M.	Yield kg/ha	Yield Rank	% TDN	Population ('000 plants/ha)
1. Pioneer	3995	53.2	3800	6	78.1	57,000
2. Pioneer	3996	53.2	3691	7	80.9	59,000
3. Pride	K730	52.5	3821	5	79.3	62,000
4. Funks	G-4017	51.8	4129	2	75.8	59,000
5. Pioneer	3979	51.0	5308	1	82.5	59,000
6. Co-op	2350	49.5	3536	9	78.5	52,000
7. Hyland	LG3	48.7	3942	3	76.8	57,000
8. Pioneer	3969	48.1	3861	4	77.4	62,000
9. Co-op	2325	46.6	3677	8	81.3	62,000
Average		50.2	3974		79.0	59,000

NOTES:

1. Yields are at 100% dry matter.
2. The corn was harvested with a forage harvester equipped with a snapper head.
3. The trial was unreplicated and therefore any statistical differences cannot be shown.
4. For more complete information contact your crop specialist, company representative and Publication 140.

PIONEER HIGH MOISTURE EAR CORN HYBRID EVALUATION

Eric Bosveld,
Soil and Crop Specialist

Location: Onslow
Previous Crop: Red Clover/Timothy
Co-operator: Bob Fiddes
Co-ordinator: David Angevine
Clarence's Farm Service

Planting Date: May 20, 1988
Planter Type: John Deere Maxemerge
Fertility: Heavy liquid manure (fall 1987)
400 kg/ha 20-0-20 broadcast and worked in
220 kg/ha DAP (18-46-0) in the planter
Weed Control: 5 kg a.i./ha Atrazine
2.5 l/ha Laddok + oil
Harvest Date: October 31, 1988

	Company	Hybrid	% D.M.	Yield (kg/ha)	Yield Rank	% TDN	Stalk % Breakage
1.	Pride	K610	63.5	4007	10	79.6	41
2.	Funks	G4017	63.2	4847	7	78.8	62
3.	Pioneer	3979	62.5	5726	3	80.2	33
4.	Pride	K730	62.0	3606	11	80.7	41
5.	Pioneer	3996	60.1	4837	8	81.3	49
6.	Pioneer	3995	59.3	2948	12	80.2	65
7.	Hyland	LG3	57.6	5202	5	81.7	33
8.	Pioneer	3969	57.5	4787	9	78.5	63
9.	Pickseed	2555	57.1	5512	4	75.4	62
10.	Pickseed	2477	57.0	6406	1	77.4	18
11.	Dekalb	DK291	56.6	5927	2	82.0	21
12.	Dekalb	DK235	56.0	5052	6	78.8	47
	Average		59.4% DM	4905 kg/ha		79.6%	44.6%

NOTES:
1. Yields are at 100% dry matter.
2. The corn was harvested with a forage harvester equipped with a snapper head.
3. The trial was unreplicated and therefore any statistical differences cannot be shown.

Comments:

By August 10th, most hybrids were in the early milk stage, although there were some hybrids that had only recently been pollinated (DK 291, DK 235 and Pickseed 2477). The cobs on Pioneer 3996, Pioneer 3995, K610, K730, G-4017 and LG3 were relatively well developed for this date. Both DK 235 and DK 291 were distinctly dark green, healthy and vigorous plants. A large proportion of all hybrids contained double cobs.

By September 12, the milk line had moved one-half way down the kernels on the hybrids K730 and G-4017, and one-quarter to one-half way down on K610, Pioneer 3995, Pickseed 2477, LG3 and Pioneer 3996, although the Pickseed 2477 kernels still were doughy near the surface.

Stalk breakage due to corn borer was high in 1988 and was especially detrimental to yields and moisture to the very early hybrids. Although the stalk breakage data is similar with many hybrids, the time at which breakage occurred was critical. Cobs that were near or in contact with the soil, in all likelihood absorbed moisture, distorting maturity indications. Also, when breakage occurred early, as it did with Pioneer 3996 and 3995, many cobs were missed by the harvester. The standability of DK291 and Pickseed 2477 was distinctly superior to all other hybrids at this demonstration. Although the data indicates severe stalk breakage of some hybrids such as G-4017, Pioneer 3979, Pickseed 2555, and DK 235, its affect on yield and percent moisture was minimal. However, if harvest had been delayed further, the breakage would have had a major affect on both these aspects.

It must be remembered that these are the results from one demonstration in one year and therefore should be used only as supplemental information. Hybrid selection should be based on the recommended list in publication 140 and 100A, since these results are based on several trials, over several years and are replicated which allows for statistical analysis.

HIGH MOISTURE SHELLED CORN HYBRID TRIAL*

James Borden, Co-operating Farmer
Jack van Roestel, Crops Extension Specialist

Location: Canard, Kings Co., N.S.

Planting Date: May 19, 1988

Planting Rate: 65,000 plants/ha (26,000 plants/ac.)

Fertility: 160 kg/ha (143 lbs/ac) of 16-40-5 in planter, plus 560 kg/ha (500 lbs/ac) of 17-17-17 incorporated, and 105 kg/ha (95 lbs/ac) of 27.5-0-0 topdressed at 8-10 leaf stage

Herbicide: Bladex 80 WP (4.25 L/ha) & Banvel 480 (1.25 L/ha) tank-mixed and applied as a late pre-emerge.

Herbicide Date: October 28, 1988

Hybrid	% T.D.N.**	% Moisture	Wet Yield (t/ha)	Yield*** (t/ha 15.5%)
DeKalb 233	91.9	31.1	8.2	6.5
Bishop's 30-30	91.0	32.0	7.5	5.9
DeKalb 291	91.3	35.3	6.6	4.9
DeKalb 24	92.1	30.1	5.9	4.8
DeKalb 235	92.7	32.9	5.7	4.4
DeKalb 333	91.6	36.0	6.0	4.4

* The trial was conducted by Borden Seeds, Canard, (DeKalb-Bishops-Funks Corn Seed, Dealer for Western N.S.). Yields and tabulation were done by Jack van Roestel, Provincial Crops Extension Fieldman. Each hybrid yield was taken from a sample area of 0.2 ha (0.5 acres).

** Total Digestible Nutrients (T.D.N.) is an indication of the energy content in a forage/feed (T.D.N.% = D.E. 0.04409) given at 100% D.M.

*** Yields have been measured in metric tonnes. Harvest was done with a 6-row combine with both the chaffer and sieve in place, so very minimal cob content was present.

UTILIZATION OF A COMPUTERIZED FEEDING SYSTEM TO FEED HIGH MOISTURE CORN COB MEAL TO DAIRY COWS

Barron Blois, Co-operating Farmer
Jack van Roestel, Crops Extension Specialist

The purpose of this project is to investigate the feasibility of utilizing a computer system to meter corn cob meal to a 100-cow dairy herd. Prior to this project, it was not known if cob meal could be successfully distributed through a computer feeder.

During the past few years the Blois' have been feeding high moisture C.C.M. that was grown and combined in the Valley, trucked to their farm, ground and ensiled in a bunker silo. Upon utilization, the corn cob meal was taken with a uni-loader and dumped on top of haylage in the feed bunk, thus offered free choice to the cows. Consequently because the cows cannot be grouped in their free stall barn, the lower producers (less than 15 kg milk/day) were getting too much of this high energy material.

The project is proposing to do away with bunk corn feeding and unload it into a short solid bottom elevator, which will, in turn, fill a 1.85m (6 ft.) diameter poly bin located in the free stall area. The bin has 750 kg. capacity and is equipped with a mechanical agitator in the base. Corn cob meal is moved a short distance from the bin by a 7.5 cm. diameter (3 in.) auger along the ceiling and gravity falls into 10 kg. hoppers which are retro-filled to facilitate a ready supply of corn for each cow (44% protein concentrate is also fed through the station). The high producing cow (more than 20 kg milk/day) steps into the station and receives 1/6 of her corn allotment from the transponder activated-computerized system (programmed for six-4 hr. feeding cycles).

With support from A.L.F.I., the project commenced in early January '88 with the purchase of the following pieces of equipment:

1) 1.85m diameter polybin, mechanical agitator, and 2m long filling elevator.
2) 6m of 7.5 cm flex. auger inside a 10 cm plastic casing run by 1 H.P. motor.
3) 5-15 kg reverse funneling hoppers situated above each feeding station.
4) 5 electric motors, plus five 10 cm diameter x 20 cm long augers for the hoppers.

Installation costs were about $9,600.00, however, this does not include the many hours of labour required to design and modify the equipment to ensure a constant delivery of this non-dried (32-45% moisture) and bulky (15% cob + ground kernel) corn product.

After initial flow problems, the inventors (Blois') alleviated the kinks and successfully fed the corn cob meal for 120 days, without further difficulties. Approximately 1,000 kg/day of C.C.M. was fed through the 5 computerized feeding stalls. The maximum daily allotment was 19 kg/head/day (11 kgs of Dry Matter).

It's valuable to look at the two ration programs used by Blois' in 1988, to feed the highest cow group (40 kg. milk or more per day).

	Costs	Nutrients Supplied: Protein	Nutrients Supplied: T.D.N.
1) 19 kgs of 42% moisture corn cob meal @ $85/tonne (10% Protein & 89% T.D.N. on Dry Matter Basis)	$ 1.62	1.10	9.79
plus			
4 kgs of 44% Protein, 74% T.D.N. supplement @ $494/tonne	$ 1.98	1.76	2.96
	$ 3.60	2.86	12.75
	vs.	vs.	vs.
2) 13 kgs of 16% Protein, 72% T.D.N. Dairy Ration @ $250/tonne.	$ 3.25	2.08	9.36
	$ -0.35 (-10%)	+ 27%	+ 27%

The Corn Cob Meal and concentrated supplement diet did cost 35 cents more for the high producer/day compared to the 16% Dairy Ration, however, 27% more nutrients were provided to this cow. More importantly, however, the entire herd increased milk production on the corn cob meal diet by 6-8% (1.5-2.0 kg/cow/day). From a standpoint of economics, the increased milk sales more than offset the higher feed costs and additional feeding equipment investment "cost out" over 10 years.

Conclusions to Date

1) A computerized feeding system can be used to deliver high moisture corn cob meal. Freezing in the augering system or poly tank was minimal and not a problem, nor was bridging in the "reverse funneled" hoppers on the feeding station, once some design changes were made.

2) Based on the '87 purchase price of Valley corn, the Blois' found feeding C.C.M. during the Jan.-April '88 period was economically superior to using a 16% commercial Dairy Ration.

During the winter of 1988-89, the Blois' will be evaluating high moisture grain corn and high moisture barley instead of the corn cob meal, under this A.L.F.I. project. They are looking to the "pure" grain corn (no cob included) to boost milk production even further, plus collect F.F.A. on this material trucked in from Kings County (bureaucratic inadequacies do not follow F.F.A. on H.M.E.C. or C.C.M.).

The findings from this winter's feeding of high moisture corn through a computerized feeding system will be summarized in the 1989 Soils & Crops Branch Project Results Booklet.

PREPLANT CONTROL OF SMOOTH BEDSTRAW

Eric Bosveld,
Soil and Crop Specialist

Location:	Ohio, Antigonish County
Design:	Unreplicated Field Size
Plot Size:	1 hectare
Spray Date:	September 7, 1988
Water Volume:	90 L/ha
Ground Speed:	8 MPH
Spray Pressure:	38 psi
Co-operating Farmer:	Mike Chisholm
Co-operating Agency:	Antigonish SCIA

Smooth Bedstraw (Gallium molluge L.) is a perennial weed that can choke out productive forage species in hay fields and pastures. It reproduces by seed and by underground rhizomes giving it the ability to quickly spread over nearby vegetation. It is considered to be a very serious weed in New Brunswick and has been reported in various areas in Nova Scotia. Therefore, for the second year in a row, a demonstration trial was set up to examine some control measures under local conditions.

The treatments were as follows:

1. Check (no spray)
2. Glyphosate at 1.07 kg.a.i./ha (Roundup T.M. @ 3 l/ha)
3. Glyphosate at 2.14 kg a.i./ha (Roundup T.M. @ 6 l/ha)
4. Mecoprop at 0.82 kg a.i./ha (mecoprop @ 5.5 l/ha)

(All treatments were tankmixed with 2.2 l/ha of 2,4-D Amine 500 to improve the dandelion control).

Visual Observations

Two weeks after spraying, the grass had died and the dandelions were dying, but the smooth bedstraw was entirely green and healthy. It appeared as if all treatments were unsuccessful. On October 13, the site was inspected again and Roundup T.M. @ 3 l/ha and the mecoprop treatment had given unsatisfactory control. Each individual plant had significant amounts of injury, but it appeared as if new shoots had developed since the herbicides were applied. Observations from the previous year suggests that there is a high probability of these plants surviving until next year.

The Roundup T.M. applied at 6 l/ha gave reasonable control of the weed with only a small portion of individual plants remaining green on October 13th.

The economics of applying Roundup at this rate (6 l/ha) must be strongly considered (approximately $107/ha), since the increased yield and quality of the forage must exceed the cost of the herbicide and its application. Furthermore, due to the weeds ability to produce a large number of seeds each season, there is a high probability the weed will re-establish itself in the

near future. Nevertheless, a suitable preplant control method certainly is valuable, although there remains the problem of "in crop" seed production.

A nearby field which was heavily infested with the weed and resceded to Timothy in the summer of 1988 had no preplant control. It will be interesting to compare the relative rate of re-infestation with these two fields next year and this should help to determine the cost effectiveness of a $107/ha treatment.

TANSY RAGWORT CONTROL IN GRASS PASTURES

Eric Bosveld,
Soil and Crop Specialist

Location:	Cloverville, Antigonish County
Design:	Unreplicated field demonstration
Plot Size:	1.2 ha
Spray Pressure:	40 psi
Co-operating Agency:	Antigonish SCIA
Co-operating Farmer:	Jim & Angus MacNeil
Water Volume:	135 l/ha
Spray Date:	September 22, 1988

O.M.	pH	P_2O_5	K_2O	Ca	Mg
10.8%	6.1	334 (H)	291 (H-)	3380 (M)	489 (H-)

Tansy Ragwort (Senecio jacobaca) is a serious poisonous weed, common to many pastures in Eastern Nova Scotia. It is a biennial plant, but under certain circumstances, it can behave like a semi-perennial. Normally, the plant germinates in the spring or fall and forms a rosette. It flowers, goes to seed and dies the following year. If the plant is cut, regrowth and blossoming can occur in the third year. Each plant can produce up to 150,000 seeds, each of which can remain viable for four years.

All the plant parts of Tansy Ragwort are poisonous, containing six different alkaloids, which accumulate in the liver and cause liver damage. Normally mature plants are avoided by grazing livestock but the small rosettes intermixed with the desirable forage often are accidently eaten. Tansy Ragwort is consumed readily if desirable forage is limiting or if contaminated hay is fed.

The magnitude and severity of this weed in Eastern Nova Scotia led to a second year of demonstration trials to control this weed with the following herbicidal treatments.

Treatments

1. Check (no spray)
2. Tankmix of Dicamba/2,4-D Amine @ 1.0 kg a.i./ha and 1.1 kg a.i./ha respectively (Banvel (400 g/l) @ 2.5 l/ha and 2,4-D Amine 500 (480 g/l) @ 2.3 l/ha)
3. 2,4-D Amine @ 2.25 kg a.i./ha (2,4-D Amine 500 (480 g/l) at 4.7 l/ha)
4. 2,4-D Ester @ 2.25 kg a.i./ha (2,4-D Ester (660 g/l) at 3.4 l/ha)

Five square meter counts of Tansy Ragwort seedlings were made per treatment three weeks after grazing. The total number of seedlings, the number of seedlings exhibiting visible herbicidal damage and the number of seedlings entirely controlled were recorded and are summarized in Table 1.

Table 1: Tansy Ragwort Seedling Counts (October 13)

	Treatment	% Injured	% Killed
1.	Check	0	0
2.	Dicamba/2,4-D Amine	77	0
3.	2,4-D Amine	43	0
4.	2,4-D Ester	55	0

Five and one half weeks after the treatments were applied, seedling counts were made again in the same manner with the results reported in Table 2.

Table 2: Tansy Ragwort Seedling Counts (November 1)

	Treatment	% Injury	% Killed
1.	Check	0	0
2.	Dicamba/2,4-D Amine	92	2
3.	2,4-D Amine	51	0
4.	2,4-D Ester	52	0

There were very few seedlings that were entirely killed by the herbicide treatments, but there was a higher percentage of seedlings exhibiting injury than last year. In the 2,4-D Amine and 2,4-D Ester treated areas, there were a moderate number of large rosettes injured from the herbicides, although not nearly as many as in the Banvel T.M./2,4-D treated area. Some large rosettes appeared totally unaffected while others appeared as if they would not survive, especially in Banvel T.M./2,4-D area. The observation was made that the plants with deeply lobed leaves appeared to be more susceptable than those with less deeply lobed leaves.

By November 1, the number of seedlings exhibiting injury increased with the Banvel T.M./2,4-D treatment and remained relatively the same with the 2,4-D's. It was noted at this time that the degree of injury in the Banvel T.M./2,4-D area was much higher and it was probable that many seedlings would not survive.

Angus made the observation in a nearby area that when the Banvel T.M./2,4-D rate was doubled, control occurred quicker and it was more complete.

The number of seedlings that germinated during the summer of 1988 was tremendous, indicating a phenominal seed population in this field. There are three principle criteria for seed germination and seedling establishment: light, moisture and temperature. The temperature and moisture were certainly not limiting in 1988 and in areas of the pasture that were undergrazed, there were virtually no Tansy Ragwort seedlings. In areas that were overgrazed, the seedling population often exceeded $100/m^2$. The undergrazed areas provided enough shade to suppress and control seedling germination, whereas the overgrazed areas allowed for prolonged light penetration and subsequently seedling establishment. Also by continuously grazing the regrowth of the grass in the overgrazed areas, the competitive ability of the grass decreases and therefore improves a seedling's chance to develop.

The amount of competition a grass pasture can exert on Tansy Ragwort seedlings is dependant on the grass species present and the fertility applied. This particular pasture was high in phosphate and potash and there was a good supply of N in the spring (220 kg/ha 34-0-0). Unfortunately nitrogen does not persist in the soil for use later in the season and when this nutrient becomes limiting, the competitive ability of the grass decreases. This allows for the establishment of Tansy Ragwort seedlings if light is able to penetrate to the soil level and moisture and temperature are not limiting.

After 2 years of trials at this location, it becomes clear that there is no easy solution to this weed and that simply spraying with currently recommended herbicides at the recommended rates will not be enough. The rates used in both years are based on Ontario's "Guide to Weed Control" (Publication 75) and perhaps are not entirely applicable in Nova Scotia.

The Banvel$^{T.M.}$/2,4-D Amine treatment has worked the best but is also over three times more expensive (approximately $55/ha for material only) than the 2,4-D Amine alone. Therefore, it should be used where there is a high Tansy Ragwort seedling population, a large number of rosettes and mature plants and on potentially high value pasture (i.e. good drainage, pH, P_2O_5 and K_2O levels, productive grass species present, etc.) 2,4-D Ester would be preferable to 2,4-D Amine and these should be used on lower value pasture and/or lower infestation levels.

Further demonstrations should be undertaken in Eastern Nova Scotia with higher herbicide rates integrated with controlled grazing, fertility management (i.e. increased total levels by N, split over the grazing season) and improved grass pasture species.

HORSCH DIRECT SEEDER DEMONSTRATION

J.E. Peill
Lyndhurst Farms Ltd.
Canning, Nova Scotia

The Horsch seeder arrived in good order during July 1988. Just prior to the machine's arrival we had a visit from Mr. Horsch who spent a day with us going over the machine, as well as the necessary changes in agricultural practices. These discussions involved our entire staff and machine operators.

During September 1988, 150 hectares of winter wheat and 20 hectares of winter canola were planted with the Horsch under different management regimes, as follows:

1. Winter canola in bush-hogged, not packed, winter wheat stubble, all straw left on (up-land);

2. Winter canola in spring wheat stubble, unworked, all straw left on, (dykeland);

3. Winter canola in spring barley stubble, unworked, all straw left on, (dykeland);

4. Winter wheat in Tibor stubble direct, all straw left on;

5. Winter wheat in bush-hogged winter wheat stubble, all straw left on;

6. Winter wheat after potatoes, chiseled and packed;

7. Winter wheat in settled, conventional seedbed after summer fallow;

8. Winter wheat after freezing beans, bush-hogged and packed;

9. Winter wheat directly into soybean stubble, all straw left on;

10. Winter wheat in wheat stubble prepared with Horsch on dyke;

11. Winter wheat directly after winter wheat without seedbar, very heavy grass infestation, Round-up treated on wet dykeland.

A set of slides showing the machine during work under some of these different conditions, as well as the resulting stand establishment by mid-October '88 is available for viewing by those interested.

Preliminary assessment of stand establishment indicate:

1. Crop Establishment, wheat or canola, was very good where the seedbed was:

   - very well settled;
   - not prepared at all;
   - prepared with Horsch only.

2. Establishment was uneven and not satisfactory where:

- seedbed too loose or puffy;
- crop residue was not evenly distributed.

In technical terms the machine performed reliably with the only problem being the odd broken knife under stoney conditions.

It was not difficult to achieve a practical work rate of 2 to 3 hectares per hour, depending on field size, conditions and refill methods. The John Deere 4650 appeared to have just the right h.p. reserve also to cope with hilly or difficult conditions. The fertilizer feature was not used this fall to avoid adding another variable to the comparison with conventional seeding methods.

The accuracy of the seed spreading pattern is good, and should not be a yield-limiting factor. Seeding depth, as indicated under 2, could be uneven.

While the double rear tires of the tractor , the tires of the seed cart and the tires of the seeder practically cover the full seeder width prior to seeding, the space under the tractor between the tires does not get settled at all in this manner. As a result, the seed in this strip is placed about 2" (5cm) deeper. As mentioned, this problem does not occur unless prior preparation was done.

Prior preparation is, however, necessary under certain circumstances, be it to cope with unevenly spread and heavy crop residue resulting from unfavourable (i.e. damp) harvest conditions, be it to incorporate manure and eliminate the manure spreader tracks, or after vegetable and potato crops. Some method of eliminating this unevenness should be found.

We are simultaneously investigating better and more accurate straw and chaff spreading and incorporation methods. I intend to visit the Paris machinery exhibition in March 1989 for this purpose.

PROJECT TT 60

A.J. Wilson,
Soil & Crop Specialist

Co-operator: Peter Clarke

Objective:

To test the Griffith Elder Master Monitor (Model E.F.C. 400) in its efficiency in determining weights under field conditions.

Master Monitor:

Description:

The Griffith Elder Master Monitor is a weighing device that attaches to the end of a combine auger. Properly calibrated, the weight apparatus is capable of giving the user a readout of area covered, wet weight, yield/area in metric or imperial measure. A combine so equipped would help the user keep better records which, in turn, should lead to more efficient production.

The Master Monitor consists of the following components:

(1) A moisture corrector for adjusting wet weight to dry weight. The corrected moistures have to be determined from a moisture meter and entered through the master monitor.

(2) A power pack which routes power from the combine batteries to the various components of the master monitor.

(3) A speed/area module: which counts the revolutions of the drive wheel or the wheel drive shaft as a result of a magnet being mounted on the wheel or wheel drive shaft. For our purpose, the magnet was mounted on the wheel drive shaft and activated by a switch in the cab. This enabled the sensor to be turned off while turning, thus giving a more accurage indication of area.

(4) A yield sensor kit; consisting of a head, a weighing plate and an unloading auger switch.

The yield sensor kit is mounted on the unloading auger. The hood deflects the grain onto the weighing plate and the weight is sent back to the master monitor in the cab.

(5) The Master Monitor: The master monitor is the control mechanism for all the functions of the system. Through it, all functions are calibrated and read.

The Master Monitor gives a read out of combine speed, batch weight, total weight, distance travelled, yield per area, wet weight and if the corrected moisture has been entered, dry weight. All in metric or Imperial measure.

Procedure:

The components were mounted on a John Deere combine in approximately 12 hours and tested in a field of oats as follows:

First, the speed area sensor was calibrated. The distance function was scrolled up to display on the monitor. The calibration key was pressed. The clear key was then pressed to set all values to zero. The combine was then moved ahead until an "x" appeared on the screen.

A stake was placed on a mark on the combine. Another stake was placed 50 meters away. The combine was driven slowly ahead towards the second stake. When the "x" appeared on the screen and the combine was close to the second stake, the distance was measured and entered by pressing the up or down key. If the figure was too large, the down key was used. The save key was used to return the combine to normal operation.

Next, the combine cutting width was entered into the master monitor by scrolling up or down until the width function was shown on the monitor. The calibration key was pressed, the width entered in inches and the save key pressed to return the function to normal.

With the monitor calibrated for all functions except yield, a field of oats was combined. We discovered that the yield area function was not working.

The distance function was wired up to the electronic clutch switch for the reel. It was felt that turning this switch off and on while turning to get an accurate distance reading would prematurely wear out the reel clutch. Therefore, an addition switch would have to be installed to correct this problem.

Yield Function Calibration:

The yield function was calibrated as follows:

When the combine tank was full, the weight function was scrolled up on the monitor. The calibration key was pressed. The clear key was used to clear values on the screen and start the calibrating procedure. The tank load of grain was dumped into a truck and sent to Steam Mill Grain Center to be weighed.

The master monitor weighed 2.3 tonnes of oats while Steam Mill weighed 2.4 tonnes. This new value was entered into the monitor and saved.

Using this method of calibrating meant that the combine was sitting idle while the truck was travelling to Steam Mill for weighing.

A better way to calibrate the combine is as follows:

Instead of waiting for figures, the combine can be working and dumping into a different vehicle when the weights are received, the new weight can then be corrected on a percent basis. For example, if the master monitor showed 2.3 tonnes and Steam Mill weighed the load to be 2.4 tonnes, then the yield would have to be corrected by a factor of $\frac{2.4}{2.3}$ or 1.043478.

Therefore, if the next tank full weighs 2.5 tonnes, then the correct weight to enter would be 2.5 x 1.043470 or 2.6 tonnes.

This procedure allows the combine to be calibrated without stopping the combine. At $115.00/hour, this is a more practical method of calibrating the monitor.

Corrections:

It was discovered that the yield area sensor switch was not working because it had been wired up wrong enroute from the factory. This problem was easily corrected by changing wires in the relay switch.

The problem of the reel clutch was solved with the addition of a second manual switch. This enabled the operator to manually turn the distance counter off when the combine was not harvesting.

Corn harvest:

On-the-go calibration was not possible when the combine moved into high moisture corn harvest with the other combines dumping into the same wagon.

At the end of the harvest season, 24 tonnes of corn were harvested with the monitor showing 27 tonnes, a 12.5% difference. This 12.5% difference should narrow as the operator becomes more familiar with the monitor. With the on-the-go calibration, this unit can be calibrated to much closer calibration.

Conclusion:

This unit has several advantages over a scale wagon, but it also has limitations.

Advantages	Disadvantages
1. It is cheaper, costing approximately $4,000.00,	1. Lowers auger height which means small truck must be used,
2. Easily calibrated,	2. With more than one combine operating, calibration can be costly,
3. Does not require additional equipment (truck to haul),	3. The same combine must b used, therefore, flexibility is lost.
4. Gives area readout along with wet weight.	

This unit is a practical alternative to a scale wagon for plot work or determining on-farm yields. The electronics are very dependable but the need to load the tank and weigh it with different scales make it unsuitable for commercial application.

SOILS & CROPS COMPETITION WESTERN REGION

A.J. Wilson,
Soil & Crop Specialist

Competitions were sponsored by the Annapolis County Soils and Crops Association and the Lunenburg County Soils and Crops Association to promote cereals and good management of forages with the following results:

Cereal Grain Competition - Annapolis County

Co-operator	Cultivar	Kg/ha*	Received	Input Costs	Net Total/ha
B. Armstrong	Leger	5756	1030	256	774
L. Pick	Cadette	4624	828	311	517
L. Evans	Cadette	4156	744	322	422
G. Jackson	Laurier	2976	533	238	295
D. Sproule	Rodeo	2417	433	146	287
J. Lawrence	Leger	2363	423	236	187
G. Bent	Max	2746	687	547	140

Price received based on barley @ $179/tonne,
max milling wheat @ $250/tonne.

Soils & Crops Pasture Competition

Annapolis County

Participant	kg/ha	% P	% TDN	Replacement Value
A. Bishop	7900	22	75	2205
E. Bishop	6786	25	73	1991
B. vanRoestel	6592	29	74	2086
J. Lawrence	6381	30	78	2142
L. Crawford	6146	22	68	1639
K. Charlton	6117	26	74	1848
L. Pick	4823	23	71	1325
C. DeNuke	4628	23	75	1294
B. Armstrong	4404	26	77	1355
C. MacMortry	4099	16	66	913
L. Hudson	3949	23	74	1112
A. Phinney	3694	27	74	1141

Lunenburg County

Participant	kg/ha	% P	% TDN	Replacement Value
L. Wile	10,394	27	74	3184
P. Falkenham	10,142	26	72	2977
D. Jodrey	8,598	22	71	2340
V. Naugler	8,309	23	71	2296
B. Mailman	8,123	25	73	2370
M. Meisner	8,109	20	72	2073
H. Crouse	7,073	21	67	1796
J. Rudolph	7,015	25	72	2033
M. Veinot	6,696	23	72	1857
T. Crouse	5,173	17	66	1184

Annapolis Co. Soils & Crops Haylage Competition

Participant	kg/ha	% P	% TDN	Replacement Value
B. vanRoestel	15,736	23	67	4245
G. Jackson	12,865	22	70	3482
A. Bishop	12,607	21	67	3059
G. Bent	11,965	21	70	3159
J. Chesley	11,818	19	66	2870
R. Banks	1,150	25	74	3406
L. Pick	10,088	22	66	2647
P. Teraud	9,380	11	62	1738

Replacement value based on corn at $202.82/tonne and 48% Soybean meal at $488.10.

* Yields were based on three-meter-square sections.

FIELD CROPS EXPO '90

Jack van Roestel,
Crops Extension Specialist

The Field Crops Expo '90 is one of the most exciting crops extension programs to be initiated in some time.

More specifically, the Expo '90 is a 3-1/2 day event being organized for mid-July, 1990 in the Kentville area. A theme of **"MAXIMUM ECONOMIC FIELD CROP YIELD IN THE 90'S"** will be conveyed through an outdoor exposition/indoor conference format. This format would consist of a) practically oriented forage, cereal and protein crops demonstration plots, b) equipment operation & adjustment demonstrations, c) industry and departmental display booths, d) special resource speakers for discussion group activities, e) provincial plowing competition, f) social events and g) alternate activities program.

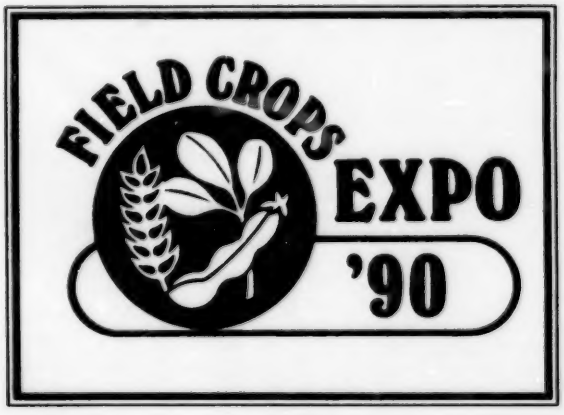
The outdoor Exposition will be held on a 22-ha. field area in Sheffield Mills (farm of W. & P. Swetnam) and the indoor conference will take place at Acadia University, Wolfville, N.S.

The Field Crop '90 Expo will be an "Informative Cropping Season Vacation" for the Maritime farmer. Government Extension and Research workers, Agri-business reps., and other interested parties will also be invited to attend the event.

Various committee workers representing N.S.D.A.M. Agric. Canada, N.S. Fed. of Agriculture and private Agri-business along with Janice Lutz, Project Manager and a plots person will be involved over the next 2 years to make this project as informative as possible for the 800-1,200 likely participants.

The Field Crops '90 Expo will illustrate and transfer the leading edge of field crop technology necessary for sustained productivity throughout the 90's.

Don't miss the opportunity to participate! All of you on the N.S. Federation of Agriculture mailing list will receive an Expo '90 information brochure in the mail shortly. If you're not on that list, contact Janice Lutz, Manager, Field Crops Expo '90, RR#1 Berwick, Kings Co., N.S., B0P 1E0. (902-538-9914)



NEUTRON PROBE SURFACE MEASUREMENTS

Robert Gordon, Agricultural Climatologist
Gary Patterson, Agriculture Canada
Gordon Murray, Summer Student

It is well known that usually the largest fluctuations in day to day soil moisture occurs near the soil surface. However, it is also the area of most interest for crop growth. Common techniques for the measurement of soil moisture include the taking of gravimetric samples which is often frowned upon because of the destruction that is often caused by taking repeated samples over a period of time. Over the past 20 years the neutron probe has become widely used throughout North America and Europe as a fast and economical method of soil moisture detection. However, the use of the neutron probe near the surface has often been erroneous because the sphere of influence of the source often extends beyond the soil surface.

Based on a similar study by Chasasyk and Naeth (1988) two shields were constructed to evaluate their effectiveness at measuring near surface soil moisture with the neutron probe. The idea behind using a surface shield with the withdrawn probe laying flat on the soil surface is that it prevents the total escape of fast neutrons emanating from the surface upward and to scatter the neutrons back in a constant manner as well as reducing the effects of radiation exposure.

This study was conducted on three sites in the Truro/Great Village area. Two seperate shields were constructed to be tested. The first shield was a polyetelene shield approximately (find dimensions) while the other shield was made entirely out of parrafin wax. Along with the shields the probe was tested by itself on the soil surface.

Site 1 which was located in Little Dyke (approximately 5 km from Great Village) was a rapidly drained, medium sand. Site 2 was also located in Little Dyke and was a well drained, loamy fine sand. Site 3 was located in Bible Hill and was a Pugwash coarse loamy till, moderately well drained.

The evaluation of the surface shields involved taking repeated measurements with the various shields and the withdrawn neutron probe while at the same time simultaneously taking a number of gravimetric surface samples. The gravimetric samples are then oven dried and the soil moisture compared with the counts ratio output from the neutron probe. Thus with a wide range of soil moisture values the relationship can be graphed.

Listed below are the correlation coefficients for the three sites for each of the three shield conditions:

Site	Shield	Correlation Coefficient
1	Bare	.574
1	Poly	.902
1	Wax	.482
2	Bare	.283
2	Poly	.987
2	Wax	.235
3	Bare	.736
3	Poly	.835
3	Wax	.944

As expected the bare withdrawn probe showed weak correlations for all three soils that ranged from .283 for the Truro soil to .736 for the Pugwash soil. The paraffin wax shield showed surprisingly unreliable results with correlation coefficients ranging from .235 to .944. In all cases the polyethelene shield displayed quite favourable results with correlation coefficients which ranged from .835 to .987.

From these preliminary tests it is quite apparent that a polyethelene surface shield could be reliably used for soil surface moisture measurements once it has been well calibrated instead of the common technique of gravimetric analysis. However, use of a paraffin wax shield or no shield at all will generally give an unreliable estimation of the surface moisture.

IRRIGATION SCHEDULING STUDY

Robert Gordon, Agricultural Climatologist
Gary Patterson, Agriculture Canada
Gordon Murray, Summer Student

Irrigation scheduling is the practice of ensuring that irrigation will only be carried out when necessary, and only as much water will be applied as is required to keep the soil moisture within the optimum target range. Once the specific soil and crop parameters have been identified only daily climatic observations are required.

Accurate irrigation scheduling can result in the following:

1) savings in labour and water due to increased knowledge of knowing when and how much water to apply to the crop.
2) estimates of future irrigation requirements for stated probabilities of recurrence can be made using past climatic records.

Two field sites were setup on the strawberry farm of Mr. Curtis Millen of Little Dyke. The two sites consisted of a:

1) a non-irrigated rapidly drained medium sand (Cornwallis soil) with physical characteristics shown in figure 1 and
2) an irrigated well drained fine loam (Truro soil) with physical characteristics shown in figure 2.

Soil moisture was determined by using a neutron probe and measurements were made three (3) times per week at the four (4) access tubes per site at 20, 40, 60, 80 and 90 cm depth. An automatic weather station was also setup at the test site to measure daily precipitation and minimum and maximum temperature.

A computer software model called the Versatile Soil Moisture Budget was used to calculate the time of irrigation. The field calculated soil moisture values were compared with the predicted values of the model.

Required inputs for the model included the following:

(1) Soil Data:

- saturation (%), a reflection of the total porosity
- field capacity (%), the amount of water in the soil after the gravitational water has been drainded, taken as moisture content at 1/3 bars
- permanent wilting point (%), amount of water contained in the soil which is unavailable for uptake, taken as moisture content at 15 bars
- depth of zones drained per day
- initial soil moisture content of each zone

(2) Phenological Data:

- seeding date
- main growth stage dates
- crop coefficients

(3) Meteorolgical Data:

- maximum daily temperature (^{o}C)
- minimum daily temperature (^{o}C)
- daily rainfall (mm)

(4) Irrigation Data:

- date and amount of water added

Results

In most cases the models estimated soil moisture was within 3-4% soil moisture by volume of the actual gravimetrically determined soil moisture. However, upon further examination of the estimated results with the actual results found an r^2 of only .67. It appears that the model is highly sensitive to phenological data which for our study was determined by consultations with various experts in this field as well as some literature on past studies which essentially gave us a wide range of possible scenarios. For example we used a crop coefficients of approximately 0.6, however this is a relative rather than absolute value and thus may be more closely approximated and result in a more highly calibrated model with future work.

Examples of model outputs

FIELD # 1 : CORNWALLIS

MAXIMUM AVAILABLE WATER: 200.5 mm

INITIAL AVAILABLE WATER: 157.8 mm on May 25

CRITICAL DEFICIT : 17.9 mm to 78.2 mm varying with stage

DATE	STAGE	INPUT	SOIL	DEFICIT	IRRIGATION	DEMAND
Mo.Da	NO	WATER	WATER		NEEDED IN	FOR WATER
7/15	2	12.0 mm	28.4 %	32.2 mm-	2 Days	Normal
7/16	2	1.2 mm	28.2 %	33.9 mm-	2 Days	Normal
7/17	2	5.2 mm	28.6 %	30.8 mm-	2 Days	Normal
7/18	2	1.2 mm	28.5 %	31.9 mm-	2 Days	Below
7/19	2	0.2 mm	28.2 %	33.9 mm-	2 Days	Normal
7/20	2	0.2 mm	28.1 %	35.5 mm-	2 Days	Normal
7/21	2	6.2 mm	28.6 %	31.0 mm-	2 Days	Normal
7/22	2	27.8 mm	29.4 %	5.3 mm	1 Days	Below
7/23	2	0.0 mm	28.7 %	11.8 mm	2 Days	Above
7/24	2	54.2 mm	31.4 % +	0.0 mm	3 Days	Below
7/25	2	19.0 mm	31.8 % +	0.0 mm	+ Days	Below
7/26	2	0.2 mm	31.1 % +	2.7 mm	3 Days	Below
7/27	2	0.0 mm	29.1 %	8.4 mm	2 Days	Normal
7/28	2	0.0 mm	28.8 %	7.4 mm	2 Days	Normal
7/29	2	0.0 mm	28.7 %	11.3 mm	2 Days	Normal
7/30	2	0.0 mm	28.2 %	16.4 mm	1 Days	Normal
7/31	2	1.2 mm	27.9 %	18.9 mm-	0 Days	Normal
8/01	2	0.2 mm	27.6 %	22.0 mm-	0 Days	Normal
8/02	2	0.0 mm	27.2 %	25.0 mm-	0 Days	Below
8/03	2	0.2 mm	26.9 %	27.7 mm-	0 Days	Normal
8/04	2	1.0 mm	26.7 %	29.6 mm-	0 Days	Normal
8/05	2	0.0 mm	26.4 %	32.1 mm-	0 Days	Normal

FIELD # 2 : RURAL

MAXIMUM AVAILABLE WATER: 214.0 mm

INITIAL AVAILABLE WATER: 171.5 mm on May 25

CRITICAL DEFICIT : 20.0 mm to 74.9 mm varying with stage

DATE	STAGE	INPUT	SOIL	DEFICIT	IRRIGATION	DEMAND
Mo.Da	NO	WATER	WATER		NEEDED IN	FOR WATER
7/15	2	12.0 mm	32.2 %	5.4 mm	2 Days	Normal
7/16	2	1.2 mm	31.8 %	10.1 mm	2 Days	Normal
7/17	2	5.2 mm	31.9 %	8.2 mm	2 Days	Normal
7/18	2	1.2 mm	31.6 %	11.9 mm	2 Days	Below
7/19	2	0.2 mm	31.1 %	16.1 mm	1 Days	Normal
7/20	2	0.2 mm	30.7 %	19.7 mm	1 Days	Normal
7/21	2	6.2 mm	31.2 %	17.2 mm	1 Days	Normal
7/22	2	27.8 mm	33.7 % +	0.0 mm	+ Days	Below
7/23	2	0.2 mm	32.9 % +	7.1 mm	3 Days	Above
7/24	2	54.2 mm	34.9 % +	0.0 mm	+ Days	Below
7/25	2	19.0 mm	37.2 % +	0.0 mm	+ Days	Below
7/26	2	0.2 mm	34.5 % +	+.2 mm	3 Days	Below
7/27	2	0.2 mm	31.8 %	9.7 mm	2 Days	Normal
7/28	2	0.2 mm	31.9 %	8.6 mm	3 Days	Normal
7/29	2	0.2 mm	31.5 %	12.4 mm	2 Days	Normal
7/30	2	0.2 mm	30.9 %	17.5 mm	1 Days	Normal
7/31	2	1.2 mm	30.7 %	19.9 mm	1 Days	Normal
8/01	2	0.2 mm	30.2 %	24.0 mm-	0 Days	Normal
8/02	2	0.0 mm	30.0 %	26.2 mm-	0 Days	Below
8/03	2	0.0 mm	29.7 %	29.0 mm-	0 Days	Normal
8/04	2	1.0 mm	29.4 %	31.1 mm-	0 Days	Normal
8/05	2	0.0 mm	29.1 %	33.7 mm-	0 Days	Normal

site # 1 CORNWALLIS

Ap sandy loam, very weak coarse subangular blocky, very friable, Ksat 11cm/hr, bulk density 1.37g/cc

Ae loamy sand, apedal single grain, loose, Ksat 14cm/hr, bulk density 1.41g/cc.

Bf loamy sand, weak-moderate subangular blocky, friable, Ksat 6cm/hr, bulk density 1.44g/cc.

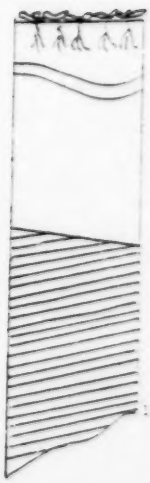
Bx loamy sand, weak coarse platy, firm, Ksat 1.1cm/hr, bulk density 1.67g/cc.

Cxj loamy sand, very weak coarse platy, friable, Ksat 3.8cm/hr, bulk density 1.72g/cc.

The Cornwallis soil is the well-drained member of the Cornwallis-Kingsport-Millar catena. It is a glaciofluvial soil characterized by having greater than 80% medium sand in its C horizon. Prior to land clearing this soil was under coniferous forest vegetation and was dominated by the processes of podzolization.

key: Ap - plow layer
Ae - zone of iron eluviation
Bf - zone of iron accumulation
Bx - fragipan layer constricting to both roots and water
Cxj - weakly developed fragipan layer

site # 2 TRURO



Ap sandy loam, weak fine-medium subangular blocky, very friable, Ksat 10cm/hr, bulk density 1.19g/cc

Ae sandy loam, apedal single grain, loose, Ksat 11cm/hr, bulk density 1.39g/cc.

Bf sandy loam, weak-moderate medium subangular blocky, friable, Ksat 6cm/hr, bulk density 1.43g/cc.

Cx loamy sand, weak-moderate coarse platy, firm, Ksat 1.0cm/hr, bulk density 1.78g/cc.

The Truro soil is the well-drained member of the Truro-Onslow-Glennolme catena. It is a glaciofluvial soil characterized by having greater than 80% fine sand in its C horizon. Prior to land clearing it was also dominated by the processes of podzolization.

SNOWMELT ADJUSTED USLE EROSIVITY ESTIMATES FOR NOVA SCOTIA

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Introduction

Since the early part of the twentieth century, an awareness of the detrimental effects of soil erosion from agricultural land has existed in the Martime Provinces of Canada. However, soil loss rarely has been measured; particularly in winter.

The Universal Soil Loss Equation (USLE) was developed by Wischmeier and Smith (1965), as a tool for the determination of soil erosion resulting from rainfall under various cropping, soil, topographic and climatic conditions.

The rainfall runoff-erosion index (R) is one of the primary parameters of the USLE. However, there has been very little published data on R values for the agricultural areas of Nova Scotia and Prince Edward Island. This has led to poor estimates of soil losses due to erosion which in turn have restricted conservation management decisions for the maritimes. It has also been difficult to ascertain the seriousness of the erosion problem and quantify soil loss. Wischmeier and Smith (1978) reported on the two most common methods of estimating the R factor. In areas where over 22 years of rainfall intensity is available, R can be calculated from the following equation:

$$R = EI_{30} \quad [2]$$

where:

E = rainstorm kinetic energy (MJ ha^{-1})
I_{30} = maximum storm intensity occurring in 30 minutes (mm h^{-1})

The above equation has often been inconvenient because of the need for at least 22 years of data. Furthermore processing of this data is rather slow and tedious. A more efficient and less time consuming method is that developed by Ateshian (1974). Madramootoo (1988) applied this method successfully to the Eastern Canadian Provinces of Quebec and Ontario. Based on the once-in- 2 year, 6 h rainfalls, R is calculated as follows:

$$R = 0.417P_{2,6} \quad [3]$$

where:

$P_{2,6}$ = once-in-2 year, 6 hour duration rainfall (mm)

Foster et al. (1981) used equation [3] to plot isoerodent maps for the United States, Hawaii, Puerto Rico and the U.S. Virgin Islands. Recently, Wingham and Stolte (1986) and Madramootoo (1988) published detailed isoerodent maps for the prairie provinces and for Quebec and Ontario, respectively. Wall

et al. (1983) determined R values for Canada east of the Rocky Mountains on a national scale while at the same time stating the need for more definite estimates of R within provincial boundaries.

Air masses from as distant as the Arctic and the Gulf of Mexico may end up over the Atlantic region of Canada. As a result, storms are more frequent in this region throughout the year than in any other part of Canada. For this reason, it is not surprising that the largest R values in Canada are found in the maritimes (Wall et al., 1983). This leads, therefore, to a greater risk of soil erosion.

Methodology

The 6-h duration maps for the mean and standard deviation of the annual extremes of rainfall for Nova Scotia and Prince Edward Island were selected from the Rainfall Frequency Atlas of Canada (RFAC). A 20 km square grid system was drawn on 1:500,000 scale provincal maps. This grid resolution was chosen because of a similar resolution for the isohyetal lines on the RFAC.

The once-in-2 year, 6 hour rainfalls were calculated at each of the grid points from the following formula (Hogg and Carr, 1985):

$$X_2 = X + K_2 S \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad [4]$$

where:

X_2 = once-in-2 year, 6 h extreme rainfall (mm)
X = mean annual, 6 h extreme rainfall (mm)
K_2 = return period frequency factor (-0.164 for a 2 year return period)
S = standard deviation of the mean annual, 6 h extreme rainfall (mm)

The average annual R values were calculated for each of the grid points by using the results from the above calculations in conjunction with equation [3]. Some of the estimated values were verified by comparing estimates of Wall et al. (1983). Isoerodent maps were then drawn from the above calculated grid points.

The calculation of the average annual erosivity indices accounting for winter conditions was estimated using the long term winter precipitation values from over 80 climatic stations in Nova Scotia and Prince Edward Island and determining the percentages of cumulative winter precipitation (December to March) to the total annual precipitation. This method has been suggested and utilized by Wischmeier and Smith (1978), Wall et al. (1983) and Madramootoo (1988). The average annual erosivity indices, adjusted for winter conditions, were derived at each grid point from the following equation:

$$R_a = R\,(1 + WP/100) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad [5]$$

where:

R_a = average annual erosivity index adjusted for winter conditions (MJ mm ha^{-1} h^{-1} yr^{-1})
WP = percentage of winter precipitation to the total annual precipitation (December-March)
R = average annual erosivity index (calculated from equation [3]) (MJ mm ha^{-1} h^{-1} yr^{-1})

Isoerodent maps based upon the above mentioned average annual erosivity indices adjusted for winter conditions were drawn.

Results and Discussion

Rainfall and runoff erosivity maps based on the average annual R values, not adjusted for winter conditions and adjusted for the winter conditions, are presented for Nova Scotia and Prince Edward Island in Figures 1 and 2, respectively.

The R values observed in Figure 1, for N.S. range from approximately 1,300 MJ mm ha^{-1} h^{-1} yr^{-1} from the Bay of Fundy in Cumberland County to the Northumberland Strait in Pictou County to 2,000 MJ mm ha^{-1} h^{-1} yr^{-1} along the Atlantic coast in Guysborough County. In the prime agricultural area of Nova Scotia, i.e. the Annapolis Valley region, R values range from 1,300 to 1,500 MJ mm ha^{-1} h^{-1} yr^{-1}. This represents the lowest values in the province. However, this area is still quite susceptible to significant soil erosion losses due to the high intensity of agricultural production, and the lack of protection of the soil. Also, many of the predominent soil types that exist in this area have a high percentage of silt in the surface horizon, leading to high erodibility. A high concentration of isoerodent lines exist near Chedubucto Bay where the values deviate by more than 500 MJ mm ha^{-1} h^{-1} yr^{-1} over a distance of 60 km, due to the high variability of extreme rainfalls in that area. Even though very little cultivated land exists, slopes in excess of 5% are common for most agricultural lands in Halifax and Guysbourough counties resulting in a severe erosion risk potential for those areas in particular.

The R values in Prince Edward Island (Figure 1) are highest along the east coast of the province (Kings county) near Souris where they reach 1,250 MJ mm ha^{-1} h^{-1} yr^{-1} (the highest values in Prince Edward Island are nearly equivalent numerically to the lowest in Nova Scotia). Cultivated slopes in this region are commonly in excess of 10%. The lowest values, approximately 1,025 MJ mm ha^{-1} h^{-1} yr^{-1}, are found along the west coast of the island from the western point of Egmont Bay to the Tignish Shore.

Higher winter erosivity indices (R_a) (Figure 2) demonstrate the erosion potential due to rain and snowmelt on thawing ground. They vary from 1,025 MJ mm ha^{-1} h^{-1} yr^{-1} in the northern part of Prince Edward Island to 2,600 MJ mm ha^{-1} h^{-1} yr^{-1} along the eastern shore of Nova Scotia. This represents a 20 to 30% increase over the R values shown in Figure 1.

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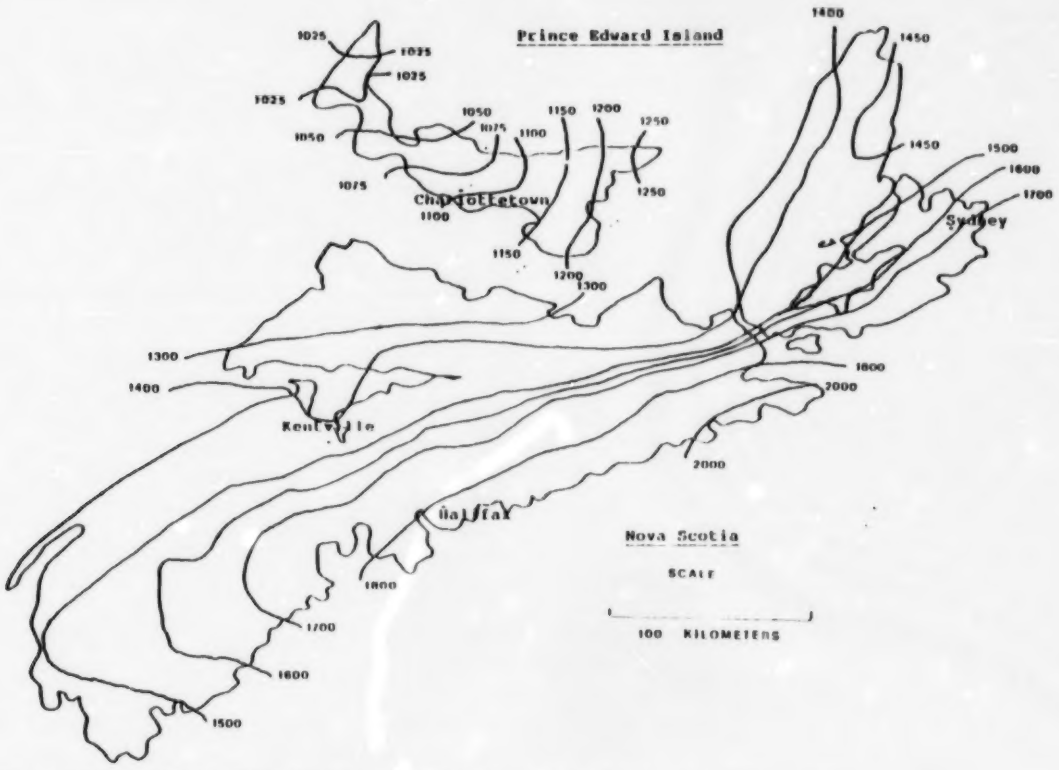

Figure 1: Erosivity indices, winter adjustment not included for N.S. and P.E.I. (MJ mm ha^{-1} h^{-1} yr^{-1}).

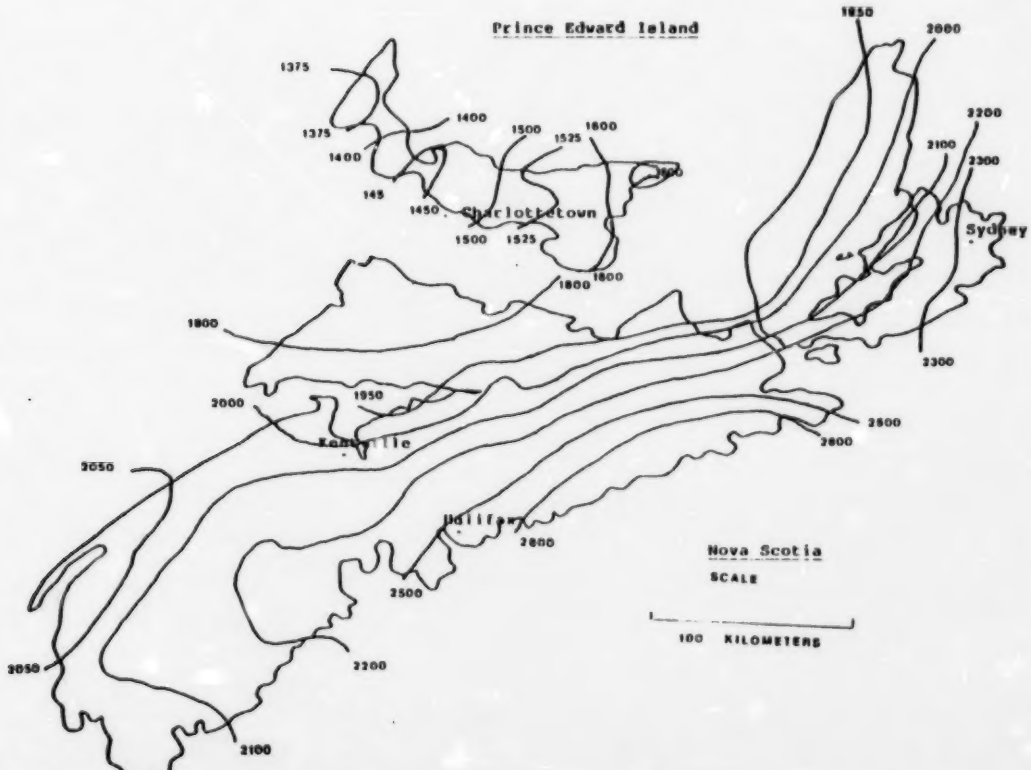

Figure 2: Erosivity indices, winter adjustment included, for N.S. and P.E.I. (MJ mm ha^{-1} h^{-1} yr^{-1}).

THE APPLICATION OF WIND FANS FOR FROST PROTECTION IN NOVA SCOTIA

PART 1: TEMPERATURE INVERSION MONITORING

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Peter Dzikowski, Agricultural Weather Specialist

Introduction

Nova Scotia has a diverse climate which allows many valuable horticultural cash crops to be successfully grown. However, the risk of late spring frosts and early fall frosts have often been detrimental to their successful harvest. Various techniques such as irrigation, orchard heaters, artifical fog, helicopters or wind machines are presently available to the farmer to allow him to compete against the forces of nature and diminish the risk of significant losses.

Frost fans have been tested throughout North America for a number of years and their effectiveness has largely depended on the existence of a ground-based temperature inversion. A temperature inversion is the phenomenon where temperature increases with height in the shallow layer above the ground. The inversion forms during calm, clear nights when the surface radiates heat away to the sky. Air in contact with the ground cools forming a stable layer with warm air aloft. The strength and depth of inversions are determined generally as a result of the maximum temperature the preceeding day, wind speed and moisture content of the air beneath the inversion.

The primary goal of this present study is to measure temperature inversions under a variety of spring and fall Nova Scotian weather conditions. Inversions measured will be compared with similar studies and the possible effectiveness of wind fans for frost protection determined.

Methodology

This study conducted during the spring and fall months of 1986 and 1987 was carried out in West Nictaux an area approximately 4 km from the town of Middleton, Nova Scotia. The predominently agricultural area has historically been saturated with apple orchards, however, recently vegetable crops and some small berry crops have been successfully grown on a large scale. The dominant soil of the area is a moderately drained, medium to course sand. The data collected was obtained from instruments on the farm of Mr. Frank Chipman.

An instrument tower was situated on the lower edge of a newly planted strawberry field approximately 7.0 acres in size with a 3% south facing slope. The tower was a standard 10.0 m triangular tower with a 3.0 m extension pole. Thermocouples with plastic, aluminum wrapped, radiation shields were positioned at 0.5, 3.0, 6.0, 10.0 and 13.0 m height on the tower. A reference thermistor and CR21 (Campbell Scientific) datalogger were positioned adjacent the tower in a standard stevenson screen. Temperatures were measured simultaneously at all levels every hour on the hour. The measurements were recorded by the datalogger onto a cassette tape for future downloading to a computer.

Possible radiation dates were identified as nights when the weather conditions conductive to radiation cooling existed. These dates were selected by an experienced meteorological technician from the a six-hourly collection of surface weather maps. A date was selected as a possible radiation date if during the 0600-1200 UTC period (the interval when the minimum temperature usually occurs) weather conditions were clear skies (less than 10% cloud cover), light winds (less than 5 knots approximately) and low dew points (no fog). Data from the Canadian Forces Weather Station at Greenwood (A) (approximately 10 km away) were used as a primary guidance for weather conditions.

Results and Discussion

Due to various technical problems associated with data collection and retrieval, the successful acquistion of all of the temperature measurements was somewhat incomplete. However, it is believed that the data successfully obtained is quite representative of all atmospheric conditions which would normally be encountered throughout the spring and fall months.

In order to examine the strength of the inversions the temperature differences were calculated based on the measured temperatures at 13.0 m and 0.5 m height. These arbitrary heights were chosen since they generally dictated the largest temperature differnce along the profile.

A number of techniques were employed to examine the frequency of occurrence of inversions and their associated magnitudes under given environmental conditions. The first step in the climatic analysis was to categorize the strengths of inversions into ranges and at the same time measure the length of time that an inversion remained in a given range. By doing so we can determine the probability that an inversion will remain at approximately the same strength for a certain period of time and thus allow the estimation of wind machine operation time.

Table 1. Frequency of inversion strength and duration.

Inversion strength	Number of consecutive hours inversion lasted					
	1	2	3	4	5 or more	hrs.
< 0.0°C	13	5	3	1	2	
0.0 - 1.1°C	26	10	1	2	6	
1.2 - 2.2°C	35	11	13	4	2	
2.3 - 3.3°C	38	20	4	3	4	
3.4 - 4.4°C	19	9	1	3	1	
> 4.5°C	9	4	0	1	0	

From table 1 it is interesting to note that inversions of > 4.5°C, never lasted for 5 or more consective hours, however any inversions lasting for more than 5 hours under one specific range were quite rare. An inspection of the climatic conditions on evenings with weak or no inversion found that overcast conditions generally prevailed often with rain. The presence of a considerable quantity of 1 hour inversions under a variety of ranges seems to promote the idea that the strengths of inversions often fluctuate considerably under conditons of low windspeed and sparse cloud cover. Thus the relationship between consecutive hours seems to be rather weak except for conditions that signified small inversions.

In order to accurately estimate the strength of an inversion and place confidence in its occurrence under various conditions a confidence interval estimate test was conducted using a standard normal distribution.

Previous studies have used similar relationships in studying the confidence of inversions on clear or nearly clear spring nights with light by measuring the nocturnal inversion at the time of minimum temperature and thus represented each 24 hour period with a single inversion. For comparison a similar technique was employed in this study (Table 2) but also the hourly measurements were used to measure the overall confidence intervals (Table 3) under various criteria. Since it appears that such a weak correlation dominates the relationship between hour to hour inversion strengths all the appropriate hourly measurements were assumed to be independent.

The results in Table 2 show that the largest inversion should occur as expected under conditons of no wind and clear skies with the air temperature near the surface < 3.0-4.0°C. It should be kept in mind, however that as you decrease the $T_{1.5m}$ temperature the sample size is somewhat smaller and as a result the confidence interval size may be affected.

Table 2. Average and upper and lower confidence intervals at 95% and 99% probability levels for the measured hourly temperature inversions.

		95%		99%	
	Mean	U	L	U	L
Radiation dates	2.3°C	2.4°C	2.1°C	2.5°C	2.0°C
Rad. dates & $T_{1.5\ m} < 5.0°C$	2.7°C	2.9°C	2.4°C	3.0°C	2.3°C
Rad. dates & $T_{1.5\ m} < 4.0°C$	2.8°C	3.1°C	2.5°C	3.2°C	2.43°C
Rad. dates & $T_{1.5\ m} < 3.0°C$	2.9°C	3.3°C	2.6°C	3.4°C	2.4°C
Rad. dates & $T_{1.5\ m} < 2.0°C$	2.7°C	3.1°C	2.3°C	3.2°C	2.2°C
Rad. dates & $T_{1.5\ m} < 1.0°C$	2.7°C	3.1°C	2.2°C	3.3°C	2.1°C
Rad. dates & $T_{1.5\ m} < 0.0°C$	2.3°C	2.7°C	1.9°C	2.9°C	1.8°C
Rad. dates and no wind	2.7°C	3.0°C	2.5°C	3.1°C	2.4°C
Rad. dates & $T_{1.5\ m} < 5.0°C$ & no wind	3.2°C	3.4°C	2.9°C	3.6°C	2.8°C
Rad. dates & $T_{1.5\ m} < 4.0°C$ & no wind	3.4°C	3.7°C	3.1°C	3.8°C	2.9°C
Rad. dates & $T_{1.5\ m} < 3.0°C$ & no wind	3.4°C	3.8°C	3.0°C	3.9°C	2.9°C
Rad. dates & $T_{1.5\ m} < 2.0°C$ & no wind	3.2°C	3.6°C	2.8°C	3.7°C	2.6°C
Rad. dates & $T_{1.5\ m} < 1.0°C$ & no wind	3.1°C	3.6°C	2.6°C	3.7°C	2.5°C
Rad. dates & $T_{1.5\ m} < 0.0°C$ & no wind	2.7°C	3.1°C	2.3°C	3.3°C	2.1°C

Table 3. Average and upper and lower limits of confidence levels at 95% and 99% probability levels.

		95%		99%	
	Mean	U	L	U	L
At time of the night-time minimum temperature (2am-8am)	2.5°C	2.9°C	2.2°C	3.0°C	2.1°C
rad. dates	2.9°C	3.4°C	2.3°C	3.6°C	2.1°C

A comparison of the results from table 2 and table 3 show quite large differences in the average inversions and thus the resulting confidence intervals. From table 2 the mean inversions for times of suggested radiation conditions existing is only 2.3°C which is somewhat smaller than the 2.9°C shown in table 3 for the average inversion at the time of minimum temperature during radiation dates. Further examination into the inversion strengths at the time of minimum temperature show that the largest inversion of the night occured on 35% of the days and on only 32% of the radiation dates.

A factor that may of somewhat lowered the inversion confidence intervals during radiation identified dates is the fact the the average inversion for 7-8 am (for all dates) was only 1.1°C and 1.3°C for 6-7 am time period as compared to values of 2.1°C, 2.0°C, 1.9°C and 1.8°C for the time periods 2-3 am, 3-4 am, 4-5 am and 5-6 am respectively. This demonstrates quite well the effect of early morning radiation and stuff have on inversions. Another point is that two time periods that were not incorporated into the analysis of radiation dates were the periods of 12-1 am and 1-2 am which had mean inversions for all the data of 2.4°C and 2.3°C respectively. Thus the results presented in this paper may be less than might be expected if the radiation date criteria had began earlier in the night and ended earlier in the morning.

Conclusion

The results represented in this report are intended as a preliminary investigation on the use of wind fans in Nova Scotia for frost protection. It is quite apparent from the data presented that inversions of > 2.5°C generally exist under radiative cooling conditions and thus the applicability of frost fans under these condtions is genuine.

HERBICIDE SCREENING TRIALS FOR COLTSFOOT

Lise LeBlanc, Weed Project Co-ordinator
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Coltsfoot, Tussilago farfara L., is a rapidly spreading, low growing perennial. It produces small yellow flower heads that resemble dandelions in the spring. The leaves, which are 10-20 cm across with large toothed margins, are produced in early summer.

Coltsfoot is difficult to control because it is very tolerant to most agricultural chemicals and if control is obtained, it is generally short lived.

Coltsfoot infestations are becoming a problem in the Maritimes, therefore studies in this area are important since the environment plays a role in the development of coltsfoot.

The objective of this project was to evaluate various candidate chemicals based on the results found in the literature.

Pre-plant Control of Coltsfoot

Experimental Objective: To evaluate leaf absorbed, translocating herbicides when applied at three different timings, to fully expanded coltsfoot foilage, in the summer and early fall.
Location: Great Village, Colchester County, Nova Scotia
Crop: No crop planted
Previous Crop: Forest
Plot size: 2 m x 6 m (2 m subplots)
Experimental Design: Randomized complete block
Replicates: 4
Equipment: Co_2 plot sprayer
Volume: 150 l/ha
Pressure: 207 kPa
At Application:

	Spray Date	Soil Surface	Air Temp.(^{o}C)	Wind	Weed Growth Stage
Subplot A	June 24/87	Dry	18	Light	4-5 leaves
Subplot B	Aug. 25/87	Wet	13	Calm	4-5 leaves up to 10-16 leaves
Subplot C	Sept. 8/87	Wet	22	Calm	4-5 leaves up to 10-16 leaves

Date of Assessment: July 14, 1987, September 3, 1987, October 24, 1987, and September 19, 1988.

Treatments	kg a.i./ha	% Coltsfoot Control*					
		October/87			September/88		
		A	B	C	A	B	C
Control	---	0	0	0	0	0	0
glyphosate (Round-up)	1.00	0	100	100	0	10	45
glyphosate (Round-up)	2.00	0	100	100	0	5	15
glyphosate (Round-up)	4.00	0	100	100	20	15	45
clopyralid (Lontrel)	0.30	100	100	95	50	25	60
clopyralid (Lontrel)	0.60	100	100	100	90	50	90
clopyralid (Lontrel)	1.20	100	100	100	100	95	95
Hoe 039866	0.50	90	90	100	30	10	25
Hoe 039866	1.00	90	90	95	25	40	25
Amitrol-t	3.00	50	50	95	70	80	75
Amitrol-t	6.00	50	50	95	50	65	50
2,4-D/Dicamba (Dycleer)	2.00 + 1.00	70	70	70	40	20	30
EFF 689	0.15	50	85	90	70	40	30
EFF 689	0.20	50	90	95	75	40	70

* 0 meaning no control and 100 meaning complete control.

Application of growth regulating herbicides in the spring, after crop and broadleaf weed emergence, have not provided adequate control of coltsfoot. This may have been due to a lesser weed coverage than later in the summer. Additionally, translocation patterns in the plant may have prevented movement of herbicides to the root systems. Fall applications of Round-up, Lontrel or Amitrol-t gave the best long term control of coltsfoot.

Pre-emergence Control of Coltsfoot

Experimental Objective: To evaluate various recommended and experimental herbicides for the control of coltsfoot.
Location: Great Village, Colchester County, Nova Scotia
Crop: No crop planted
Previous Crop: Forest
Plot size: 2 m x 5 m
Experimental design: Randomized complete block
Replicates: 4
Equipment: Co_2 plot sprayer
Volume: 150 l/ha
Pressure: 207 kPa
At Application:

Spray Date	Soil Surface	Leaf Surface	Air Temp(^{o}c)	Wind	Cloud Cover	Weed Growth Stage
July 21/87	Dry	Dry	19	calm	0%	Freshly harrowed Soil No growth

Dates of Assessment: August 10, 1987, September 3, 1987
October 24, 1987, and September 19, 1988.

Treatments		% Coltsfoot Control			
	kg a.i./ha	Aug/87	Sept/87	Oct/87	Sept/88
Control	---	0	0	0	0
Atrazine	2.00	75	75	75	60
Atrazine	4.00	75	60	35	30
prometryne (Geagard)	2.50	80	80	65	75
hexazinone (Velpar)	2.00	85	90	90	75
terbacil (Sinbar)	2.00	60	80	80	65
oxyfluorfen (Goal)	1.00	70	85	75	70
chlorsulfuron (Glean)	0.05	85	95	90	60
chlorsulfuron (Glean)	0.10	100	100	95	80
chlorsulfuron (Glean)	0.15	100	100	100	70
linuron (Lorox)	1.00	40	65	80	30

Atrazine, Velpar and Glean gave the best control by the end of summer and fall. Glean still provided continuing control by the next fall. Large field scale trials will be conducted because of the rhizome nature of the weed. It can be difficult to analyze long term control in small plots because the rhizomes from a plot may grow into adjacent plots.

Control of Coltsfoot Sprayed at Bloom

Experimental Objective: Coltsfoot is easily identified in the spring while in bloom. This is an ideal time for property owners to apply treatments. The objective of this research was to determine the efficacy of soil active treatments applied at this time of the year.
Location: Great Village, Colchester County, Nova Scotia
Crop: No crop planted
Previous Crop: Forest
Soil Type: Truro Sandy loam
Experimental Design: Randomized complete block
Replicates: 4
Equipment: CO_2 plot sprayer
Volume: 240 L/ha
Pressure: 262 kPa
At Application:

Spray Date	Soil Temp. (^{o}C)	Air Temp. (^{o}C)	Cloud Cover	Weed Growth Stage
May 2/88	6^{o}C	3^{o}C	100%	buds & bloom, heavily fed on by deer, no leaves emerged

Date of Assessment: September 11, 1988

Experimental Objective: To evaluate various herbicides for the control of coltsfoot at the bloom stage.

Treatment	kg a.i./ha	% Coltsfoot control*
Control	-	28
chlorsulfuron (Glean)	0.01	83
chlorsulfuron (Glean)	0.02	73
chlorsulfuron (Glean)	0.04	74
chlorsulfuron (Glean)	0.08	89
dicamba	0.05	29
dicamba	1.00	38
dicamba	2.00	53
atrazine	4.00	50
atrazine	8.00	93

*Control is expressed as % ground area not infested with coltsfoot at time of assessment.

Due to excessive growth of other vegetation, these plots will not be re-evaluated in 1989. At this time, chlorsulfuron (Glean) appears to be an acceptable control at 10 grams a.i./ha. Two applications of Glean should be evaluated in successive springs to see if eradication is possible. Dicamba and atrazine were not effective at agricultural rates.

Please note that several chemicals used for these 3 experiments are experimental and have not been registered for such a use at this time.

CONTROL OF PINEAPPLEWEED IN WINTER WHEAT

D.J. Doohan & K.R. Silver

Experimental Objective: The Matricaria species, particularly scentless chamomile and pineappleweed have been difficult to control in winter cereals with spring herbicide treatments. Germinating in the fall as winter annuals, the well established rosettes treated in the spring are not susceptible to some herbicide treatments that control these weeds in the seedling stage. Additionally, some herbicides have no residue to control seedlings that germinate after applications. This screening trial is looking for a solution to these problems.

Experiment Location: Woodville, Kings County

Crop Variety - Monopol; Soil type - Cornwallis loamy sand; O.M. - 1.2%*; pH - 6.9; Sand - 76.8%; Silt - 20%; Clay - 3.2%; Planting date - 09 14 87; Row width - 15 cm; Plot size - 2m by 5m; Experimental design - randomized complete block; Replicates - 4; Previous crop - snapbeans; AT APPLICATION: Date - 05 09 88; Weather - sunny, 19.5 C, soliage and soil dry, soil temp. 20.5 C; Weed stage - well developed rosettes from previous fall and a few seedlings - cotyledon to 2 leaf stage; Crop stage - growth stage 31 to 32; Equipment - CO_2 hand held sprayer; Volume - 240 L/ha; Pressure - 262 kPa; Assessment method - quadrats (0.25 sq. m.) were placed in each plot and rosettes within the quadrat were marked at the time of application. Spring germinating seedlings were counted as well. Control calculated from counts made at time of assessment. Overall visual assessment of control on entire plot was made at last assessment. Dates of assessment - 06 13 88, 07 06 88 and 08 11 88. No visible crop injury was evident at final assessment.

* O.M. by Walkley-Black method

Treatment	Rate/ha kg active	Pineappleweed Control*						Yield t/ha
		Established Rosettes			Spring Seedlings		Visual Overall	
		06 13	07 06	08 11	07 06	08 11		
Control	0	0	0	0	7	5	0	5.53
Refine+Agral 90	0.015 + 0.2%	0	50	100	51	77	95	5.58
Ultim+Agral 90	0.015 + 0.2%	0	64	100	69	100	100	4.97
Dyvel	0.50	0	15	19	56	63	20	5.46
Target	0.60	0	0	33	47	55	27	5.97
Kilmor	0.53	0	0	33	47	68	70	5.13
Estaprop	1.1	0	27	100	56	80	67	5.97
Buctril M	0.56	0	13	50	9	36	47	5.35

* Visual rating of 0 meaning no control and 100 meaning complete control.

Conclusion:

Of the registered herbicides, Kilmor and Estaprop gave the best control at 70%.

Refine and Ultim gave the best control at 95 and 100% control. As of yet, they are not registered but we anticipate registration in the near future.

HERBICIDE SCREENING IN BARLEY AND WHEAT FOR CROP TOLERANCE AND CONTROL OF WILD OATS

D.J. Doohan & K.R. Silver

Experimental Objectives: As infestation of wild oats continue to spread in Nova Scotia, there is growing concern among our grain growers about the quality of our feed grains and the threat of impurities for certified seed growers. This trial was conducted to evaluate wild oat herbicides. Of major concern was the safety of use on crop cultivars as well as the effectiveness in controlling wild oats.

Experiment Location: Waterville, Kings County

Crop and Variety - barley (Leger), barley (Rodeo) and wheat (Max); Soil type - Berwick sandy loam; O.M. - 4.9%*; pH - 6.1; Planting date - 05 10 88; Row Width - 15 cm; Plot size - 2m by 2.5m; Experimental design - randomized complete block; Replicates - ; Previous Crop - barley; AT APPLICATION: Date - 06 03 88; Weather - lig cloud, clearing, 15 C, foliage and soil dry, soil temp 23 C; Crop stage - barley in growth stage 21 to 22, wheat in growth stage 20 to 21; Weed stage - wild oats 3 to 4 leaf + tiller; Broadleaf weed control - entire area received an application of bromoxynil/MCPA at 0.56 kg active/ha (06 09 88); Equipment - CO_2 hand held sprayer; Volume - 240 L/ha; Pressure - 262 kPa; Date of assessment - (07 13 88) control of wild oats and crop injury, (07 29 88) delay in barley maturity; Date of harvest - 08 19 88.

* O.M. - Loss by ignition method.

Treatment	Rate/ha kg/active	Control Wild Oats* 07 13 88				Yield (t/ha)		
		Leger	Rodeo	Max	Ave.	Leger	Rodeo	Max
Control	-	0	0	0	0	2.85	3.27	2.37
Avenge 200C	0.70	95	96	96	95.7	3.17	3.98	2.84
Avenge 200C	0.85	98	95	95	96.0	3.18	3.24	2.27
Mataven	0.42	96	96	85	92.3	3.60	4.34	3.29
Hoegrass	0.70	93	65	85	81.0	2.77	3.22	2.83
Hoegrass	0.80	99	86	91	92.0	2.76	3.21	3.29

* 0 meaning no control and 100 meaning complete control.

Conclusion:

Treatment with Avenge 200C caused the most severe injury on wheat but was effective in controlling wild oats. The considerable injury to crops from Hoegrass resulted from spraying too late in the day when drying conditions were too slow.

Mataven gave good control of wild oats without causing much injury to the crop.

CONTROL OF ROUGH HAIR GRASS IN WINTER WHEAT

D.J. Doohan & K.R. Silver

Experimental Objective: Objective to screen herbicide treatments for the control of grass in winter wheat.

Experiment Location: Woodville, Kings County

Crop variety - Monopol; Soil Type - Cornwallis loamy sand; O.M. - 3.0%*; pH - 6.6; Sand - 69.4%; Silt - 20.6%; Clay - 10.0%; Planting date - 09 13 87; Row width - 15 cm; Plot size - 2m by 5m; Experimental design - randomized complete block; Replicates - 4; Previous crop - snapbeans; AT APPLICATION: Date - 10 15 87; Weather - sunny, 15 C, soil moist, foliage dry; Soil temp. - 12 C; Grass stage - 2 to 4 leaf; Crop stage - growth stage 21; Date - 05 01 88; Weather - overcast, 7 C, soil and foliage moist; Soil temp. - 4.5 C; Grass stage - growth stage 55; Crop stage - growth stage 31; Equipment - CO_2 hand held sprayer; Volume - 240 L/ha; Pressure - 262 kPa; Date of assessment - 08 02 88; Date of harvest - 08 19 88.

* O.M. - Walkley-Black method.

Treatment	Rate/ha kg active	Application Date	Crop Injury	Grass Control	Yield t/ha
Weedy Control	-	-	0	0	6.80
Lorox	0.50	101587	5	98	6.27
Hoegrass	1.00	101587	0	100	6.59

Conclusion:

Hoegrass gave 100% control of rough hair grass and Lorox gave excellent control as well (Lorex is only registered in spring wheat, oats and barley). Neither treatment carried a significant increase or decrease in crop yield.

Other herbicides had been tested but they are not registered as of yet.

HERBICIDE SCREENING IN BARLEY

D.J. Doohan & K.R. Silver

Experimental Objective: To evaluate what are basically broadleaf herbicide treatments on barley. In this screening trial, new experimental compounds are compared with a few registered mixtures.

Experiment Location: Waterville, Kings County

Crop Variety - Leger; Soil Type - Berwick sandy loam; O.M. - 4.9%*; pH - 6.1; Planting date - 05 10 88; Row Width - 15 cm; Plot size - 2m by 5m; Experimental design - randomized complete block; Replicates - 4; Previous crop - barley; AT APPLICATION; Date - 06 04 88; Weather - overcast, 14 c, foliage dry, soil moist, soil temperature 13 C; Crop stage - growth stage 21-22; Weed stage - broadleaf weeds - 2 to 6 leaf, wild oats and annual grasses - 3 to 4 leaf + tiller; Equipment - CO_2 hand held sprayer; Volume - 240 L/ha; Pressure - 262 kPa; Date of assessment - (07 13 88) crop injury (07 29 88) delay in crop maturity, (08 18 88) broadleaf weed control and (08 27 88) smooth crab grass (CG) control; Major broadleaf weeds - lamb's-quarters (LQ), wild buckwheat (WB) and yellow wood-sorrel (WS); Date of harvest - 09 18 88.

* O.M. - loss by ignition method.

Treatment	Rate/ha kg active	Crop Injury	Delayed Maturity**	Weed Control*				Yield t/ha
				LQ	WB	WS	CG	
Untreated Control	--	0	0	0	0	0	0	3.24
Refine+Agral 90	0.0075 + 0.2%	8	0.5	100	75	30	8	2.99
Refine+Agral 90	0.015 + 0.2%	15	1.0	100	100	38	18	3.05
Ultim+Agral 90	0.0075 + 0.2%	40	2.2	100	100	73	55	2.51
Ultrim+Agral 90	0.015 + 0.2%	41	2.0	100	75	68	50	2.83
Buctril M	0.56	8	0.0	100	100	38	0	3.20
Blagal	0.84	14	0.75	100	73	5	20	3.38
Lorox + MCPA	0.28 + 0.56	23	0.75	100	98	70	55	3.00

* 0 meaning no control and 100 meaning complete control.
** Delay in maturity rated on a scale of 0.0 to 3.0.
LQ-Lambsquarters, WS-Yellow Wood sorrel, CG-Crabgrass, WB-Wild oats.

Conclusion:

All herbicides gave excellent lambsquarters control at most rates. No treatment gave adequate control of yellow wood sorrel. The greatest suppression of crabgrass was with Ultim and Lorox + MCPA. Ultim also caused the greatest crop injury. The highest yielding treatment was with Blagal. Ultim and Refine are not registered for use in the Maritimes. We are anticipating registration in the near future.